

AD-A091 449

ACKENHEIL AND ASSOCIATES INC PITTSBURGH PA

F/G 13/13

NATIONAL DAM INSPECTION PROGRAM. WHITNEY RIDGE DAM (NDI NUMBER --ETC(U)

JUL 80 J P HANNAN, J E BARRICK

DACW31-80-C-0026

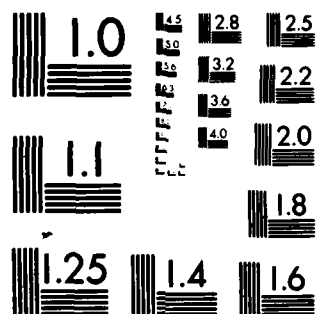
NL

UNCLASSIFIED

1.0
2.0
3.0



END
DATE
FILMED
81-1
DTIC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

AD A091449

OHIO RIVER BASIN
NINEMILE RUN
WESTMORELAND COUNTY

PENNSYLVANIA

NDI No. PA 00474
PENN DER No. 65-24

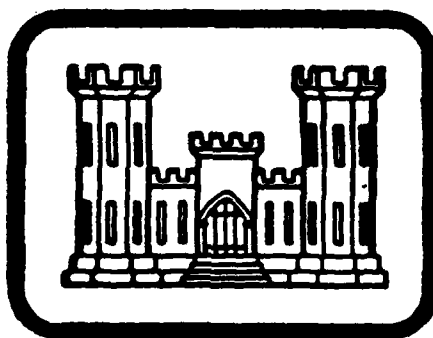
(1)
B S

WHITNEY RIDGE DAM

BROWNFIELD BROTHERS COAL COMPANY

DACW 31-80-C-0026

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



PREPARED FOR

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
BALTIMORE, MARYLAND 21203

BY

ACKENHEIL & ASSOCIATES GEO SYSTEMS, INC.
CONSULTING ENGINEERS
1000 BANKSVILLE ROAD
PITTSBURGH, PENNSYLVANIA 15216

DDC FILE COPY

"Original contains color
plates: All DDC reproductions
will be in black and
white"

JULY 1980

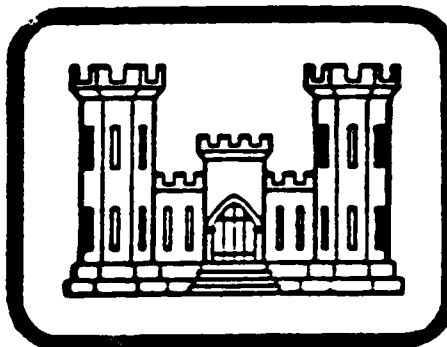
8011 03 138

(6) OHIO RIVER BASIN

WHITNEY RIDGE DAM (NOT Number PA 00474)
WESTMORELAND COUNTY, COMMONWEALTH OF PENNSYLVANIA
NDI NO. PA 00474
PennDER NO. 65-24

BROWNFIELD BROTHERS COAL COMPANY

Westmoreland County, Commonwealth of
Pennsylvania. PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



James Piffenman

Prepared for: DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

Prepared by: ACKENHEIL & ASSOCIATES GEO SYSTEMS, INC.
Consulting Engineers
1000 Banksville Road
Pittsburgh, Pennsylvania 15216

12/82
15D-H-W-31-4-2-4-26
Date: 11 July 1980

411765

Form 50
A

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams for Phase I investigations. Copies of these guidelines may be obtained from the Department of the Army, Office of Chief of Engineers, Washington, D.C. 20314.

The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon visual observations and review of available data. Detailed investigations and analyses involving topographic mapping, subsurface investigations, materials testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify the need for such studies which should be performed by the owner.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of the dam depends on numerous and constantly changing internal and external factors which are evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some time in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I investigations are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" (PMF) for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

SYNOPSIS OF ASSESSMENT AND RECOMMENDATIONS

NAME OF DAM: Whitney Ridge
STATE LOCATION: Pennsylvania
COUNTY LOCATION: Westmoreland
STREAM: Unnamed Tributary to Ninemile
Run which is tributary to
Loyalhanna Creek.
DATE OF INSPECTION: 28 November 1979
4 June 1980
COORDINATES: Lat. 40°14'24",
Long. 79°23'54"

ASSESSMENT

Based on a review of available design information and visual observations of conditions as they existed on the date of the field inspection, the general condition of the Whitney Ridge Dam is considered to be poor.

This assessment is based on visual observations and hydraulic calculations that indicated:

1. A possible inadequate margin of safety against slope failure as indicated by evidence of high ground water in the embankment.
2. Inability to locate outlet works system components or operate observed controls.
3. Poor hydraulic conditions at the Principal Spillway including dense tree and brush growth in the spillway channel and deterioration of the concrete overflow weir and channel bottom paving.
4. "Inadequate" spillway capacity as determined using the HEC-1 Computer Program.

The structure is a "small" size, "high" hazard dam. Corps of Engineers guidelines recommend a Spillway Design Flood (SDF) 1/2 to 1 times the Probable Maximum Flood for a "small" size, "high" hazard dam. Whitney Ridge Dam's Spillway Design Flood is 1/2 the Probable Maximum Flood (PMF). Spillway capacity is "inadequate" because the non-overflowing flood discharge capacity, as estimated using the HEC-1 computer program, was found to be 45 percent of the PMF. The spillway is not "seriously inadequate" because in the opinion of the evaluating engineer, the dam will not fail when overtopped by the SDF.

SYNOPSIS OF ASSESSMENT AND RECOMMENDATIONS (CONT'D)
Whitney Ridge Dam

The visual inspection indicated deficiencies which are considered correctable. The deficiencies can be reduced or corrected through implementation of the following recommended remedial, monitoring and/or maintenance efforts.

RECOMMENDATIONS

1. Additional Investigations: It is recommended that the owner immediately retain the services of a registered professional engineer knowledgeable and experienced in the design and construction of earth dams and masonry spillways to provide a detailed engineering investigation of Whitney Ridge Dam. This investigation should include but not be limited to the following:

(a) Detailed evaluation of spillway capacity and stability and development of recommendations for remedial action.

(b) Detailed investigation of the seepage and wet conditions and structural stability of the embankment.

(c) Investigation of the outlet works with specific recommendations on making it operable and including provisions for upstream flow control.

2. Emergency Operation and Warning Plan: Concurrent with the additional investigations recommended above, the owner should develop an Emergency Operation and Warning Plan including:

(a) Guidelines for evaluating inflow during periods of heavy precipitation or runoff.

(b) Procedures for around the clock surveillance during periods of heavy precipitation or runoff.

(c) Procedures for drawdown of the reservoir under emergency conditions.

(d) Procedures for notifying downstream residents and public officials, in case evacuation of downstream areas is necessary.

SYNOPSIS OF ASSESSMENT AND RECOMMENDATIONS (CONT'D)
Whitney Ridge Dam

3. Remedial Work. The Phase I Inspection of Whitney Ridge Dam also disclosed several deficiencies of lower priority which should be corrected immediately.

(a) Remove the trees and root systems with a diameter greater than 1/2 inch from the embankment and groins. This work should be performed under the direction of a professional engineer, knowledgeable in dam design and construction.

(b) Closely mow the embankment slopes, crest, groins, abutments and immediate downstream areas. Remove the cuttings from the site.

(c) Locate and backfill completely, all animal burrows on the embankment, groins and adjacent abutment areas.

(d) Replace lost riprap along the upstream slope of the embankment.

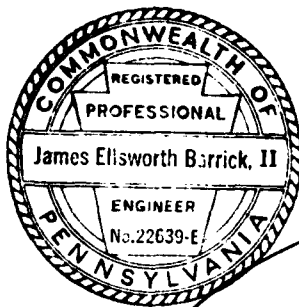
(e) Raise the embankment crest to design elevation.

(f) Remove boulders, trees, dountimber and debris from the principal spillway approach and discharge channels.

(g) Develop and implement formal maintenance and inspection procedures.

4. Orderly Breaching: In lieu of performing the above recommendations, the owner should engage the services of a professional engineer, knowledgeable in dam design and performance, to prepare specifications for breaching the structure, to make it incapable of impounding water. The structure should then be breached under the direction of the professional engineer and in accordance with applicable state and local regulations.

SYNOPSIS OF ASSESSMENT AND RECOMMENDATIONS (CONT'D)
Whitney Ridge Dam



James P. Hannan 24 July 1980
James P. Hannan Date
Project Engineer

James E. Barrick 24 July 1980
James E. Barrick, P.E. Date
PA Registration No. 022639-E

Approved by: _____ Date

WHITNEY RIDGE DAM



OVERVIEW

TABLE OF CONTENTS

	<u>Page</u>
PREFACE	i
SYNOPSIS OF ASSESSMENT AND RECOMMENDATIONS	ii
OVERVIEW PHOTOGRAPH	vi
SECTION 1 - PROJECT INFORMATION	
1.1 General	1
1.2 Description of Project	1
1.3 Pertinent Data	3
SECTION 2 - ENGINEERING DATA	
2.1 Design	6
2.2 Construction	6
2.3 Modification/Repair	6
2.4 Operation	7
2.5 Evaluation	7
SECTION 3 - VISUAL INSPECTION	
3.1 Findings	8
3.2 Evaluation	14
SECTION 4 - OPERATIONAL FEATURES	
4.1 Procedure	15
4.2 Maintenance of Dam	15
4.3 Inspection of Dam	15
4.4 Warning System	15
4.5 Evaluation	15
SECTION 5 - HYDROLOGY AND HYDRAULICS	
5.1 Evaluation of Features	16
SECTION 6 - STRUCTURAL STABILITY	
6.1 Available Information	18
6.2 Evaluation	19

TABLE OF CONTENTS (cont'd)

	<u>Page</u>
 SECTION 7 - ASSESSMENT AND RECOMMENDATIONS	
7.1 Assessment	20
7.2 Recommendations.	21
 APPENDIX A - VISUAL INSPECTION CHECKLIST	
Visual Observations Checklist I	A1
Field Plan	A13
 APPENDIX B - ENGINEERING DATA CHECKLIST	
 APPENDIX C - PHOTOGRAPHS	
Photo Key Map	C1
Photos 1 through 14	C2
Detailed Photo Descriptions	C9
 APPENDIX D - HYDROLOGY AND HYDRAULICS ANALYSES	
Methodology	D1
Engineering Data	D3
HEC-1 Data Base	D4
Loss Rate and Base Flow Parameters . .	D5
Elevation-Area-Capacity Relationship .	D5
Overtop Parameters	D6
Principal Spillway Parameters	D6
Program Schedule	D6
HEC-1 Computer Analysis	D7
Reservoir/Spillway Hydrologic Performance Plot	D10
 APPENDIX E - PLATES	
List of Plates	E1
Plates I through III	E2
 APPENDIX F - GEOLOGY	
Geomorphology	F1
Structure	F1
Stratigraphy	F1
Geologic Map	F2
Geologic Column	F3

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
WHITNEY RIDGE DAM
NATIONAL I. D. NO. PA 00474
PennDER No. 65-24

SECTION 1
PROJECT INFORMATION

1.1 GENERAL

a. Authority: The Phase I investigation was performed pursuant to authority granted by Public Law 92-367 (National Dam Inspection Act) to the Secretary of the Army through the Corps of Engineers, to conduct inspections of dams throughout the United States.

b. Purpose: The purpose of the investigation is to make a determination on whether or not the dam constitutes a hazard to human life or property.

1.2 DESCRIPTION OF PROJECT

a. Dam and Appurtenances:

(1) Embankment: Whitney Ridge Dam was designed and constructed as an earthfill structure with "puddle" clay cutoff into the foundation. The embankment is 500 feet long, with a maximum toe to crest height of 18 feet. The embankment's upstream slope was observed to be 2.3H:1V above the waterline; the downstream slope was observed to be 2H:1V and contained several embedded concrete cutoff walls.

(2) Outlet Works: Outlet works reportedly consist of of two cast iron pipelines through the embankment near the left abutment. One is a 12 inch diameter pond drain and the other is an 8 inch diameter water supply line. They were reportedly encased in a cement masonry wall, three feet wide by 9 feet high by 20 feet long.

(3) Principal (and Emergency) Spillway: An uncontrolled open channel spillway on the right abutment maintains the reservoir pool level and passes storm flows. The spillway consists of an active discharge channel along the right abutment, that provides for outlet of normal and small storm flows. Larger flows will also pass the older, left portion of the spillway. The spillway control section is a broad crested weir with a concrete overflow wall at the downstream edge.

Below the spillway, the stream flows into a natural channel which parallels the embankment. The channel is approximately 30 feet from the toe of the downstream slope.

(4) Freeboard Conditions: The vertical distance between the normal reservoir pool and the top of the spillway training wall is 5.0 feet. The freeboard between the normal pool and minimum crest elevation is 3.2 feet.

(5) Downstream Conditions: The unnamed tributary to Ninemile Run below Whitney Ridge Dam passes through a relatively wide, moderately steep sided valley for about one mile where it joins Ninemile Run. In the first two miles below the dam at least five inhabited dwellings lie on the floodplain. Ninemile Run flows into Loyalhanna Creek near Youngstown, Pennsylvania.

(6) Reservoir: Whitney Ridge reservoir is about 700 feet long at normal pool elevation and has a normal surface of 6.4 acres. When the pool is at the crest of the dam, the reservoir length increases to 750 feet and the surface area is 9 acres.

(7) Watershed: The watershed contributing to Whitney Ridge reservoir is mostly woodland and pastureland and is only sparsely populated. A twenty acre rock quarry is located within the watershed, on the slope of Chestnut Ridge to the east.

b. Location: Whitney Ridge Dam is located in Unity Township, Westmoreland County, Pennsylvania, approximately 1.5 miles south of Baggaley along Pennsylvania Route 982.

c. Size Classification: The dam has a maximum storage capacity of 79 acre-feet and a maximum toe to crest height of 18 feet. Based on the Corps of Engineers guidelines, this dam is classified as a "small" size structure.

d. Hazard Classification: Whitney Ridge Dam is classified as a "high" hazard dam. In the event of a dam failure, inhabited dwellings, and commercial development on the floodplain below the dam could be subjected to substantial damage and loss of life could result.

e. Ownership: Whitney Ridge Dam and Reservoir are owned by Brownfield Brothers Coal Company. Correspondence should be addressed to:

Brownfield Brothers Coal Company
2420 Cypress Drive
Greensburg, Pennsylvania 15601
(412) 837-4457

f. Purpose of Dam: Whitney Ridge Dam was constructed to provide a water supply reservoir for the Whitney Mine of the H. C. Frick Coal Company. It currently serves no known purpose.

g. Design and Construction History: Whitney Ridge Dam is an earth embankment built by P.F. McCann for the Hostettler-Connellsville Coke Company in 1899. It was designed and constructed under the supervision of N.A. Barnhart, Engineer for the Hostettler-Connellsville Coke Company.

h. Normal Operating Procedure: Whitney Ridge Dam was designed to operate as an uncontrolled structure. Under normal operating conditions, the pool level is maintained at Elev. 1185.0 by the overflow weir of the principal spillway. The locations and operability of the outlet works pipelines are unknown.

1.3 PERTINENT DATA

a.	<u>Drainage Area:</u>	2.2 sq. mi.
b.	<u>Discharge at Dam Facility:</u>	
	Maximum Flood at Dam Facility	Unknown
	Principal (and Emergency) Spillway	
	Capacity at Top of Dam	1656 cfs
c.	<u>Elevation (feet above MSL)</u>	
	Design Top of Dam	Unknown*
	Current Top of Dam (low point)	1188.2
	Normal Pool	1185.0*
	Principal Spillway	
	Overflow Crest	1183.9
	Maximum Tailwater	Unknown
	Downstream Toe of Embankment	1170+
	Inlet Invert of Pond Drain	Unknown
	Outlet Invert of Pond Drain	1168+
	Inlet Invert of Water Supply Pipeline	Unknown*
	Invert of Water Supply Pipeline at Control Chamber	Unknown*

d. Reservoir Length

Length of Maximum Pool	750 feet
Length of Normal Pool	700 feet

e. Reservoir Storage

Current Top of Dam	79 acre-feet
Normal Pool	55 acre-feet*
Principal Spillway Weir Crest	48 acre-feet*

f. Reservoir Surface

Current Top of Dam	9.0 acres
Principal Spillway Crest	6.1 acres*
Normal Pool	6.4 acres*
Sediment Pool	6.4 acres*

g. Embankment

Type	Earth*
Length	500 feet
Height	18 feet
Crest Width	
Normal	10 feet
Minimum	8 feet
Slopes	
Upstream	2.3H:1V
Downstream	2.0H:1V
Impervious core	Unknown
Cutoff provisions	Yes-"Puddle" clay foundation cutoff and concrete walls embedded in downstream slope
Grout curtain	Yes*

h. Principal (and Emergency) Spillway
(Regulating And Emergency Outlet)

Type	Broadcrested weir in open channel on right abutment
Length of Weir (Effective)	110 feet
Weir Crest Elevation	Varies from 1183.9 to 1185.9

i. Outlet Works (Pond Drain)

Type	12 inch cast iron
Inlet	Unknown
Upstream Flow Control	Unknown
Conduit length	Unknown
Gate Valve	Yes
Anti-seep Collars	One*

j. Outlet Works (Water Supply Pipeline)

Type	8 inch cast iron*
Inlet	Unknown
Upstream Flow Control	Unknown
Conduit length	Unknown
Gate Valve	Yes
Anti-seep Collars	One*

*Taken or derived from original specifications and/or drawings.

SECTION 2 ENGINEERING DATA

2.1 DESIGN

The files of the Commonwealth of Pennsylvania, Department of Environmental Resources (PennDER) were reviewed. No engineering data related to the original design of the embankment and spillway was found. The dam was reportedly designed by N.A. Barnhart, Engineer for the Hostetter-Connellsville Coke Co.

A post construction design report was prepared for the Water Supply Commission of Pennsylvania by State engineers, based on a site inspection in December 1914. The report stated that the dam was 500 feet long, 30 feet high, had an upstream slope of 2H:1V and a downstream slope of 1.5H:1V. The embankment was said to be an earthfill structure with a "puddle" clay cutoff wall constructed to a foundation clay layer.

The principal spillway, located on the right abutment, was determined to have a capacity of 805 cfs/square mile of watershed.

Two outlet works pipes were reported, a 12 inch diameter cast iron pond drain and an eight inch diameter cast iron water supply pipe. The pipes were reportedly encased in a concrete block, 3 feet thick, 9 feet wide and 20 feet long.

Considerable leakage and seepage through the embankment were noted in this report.

2.2 CONSTRUCTION

The dam was constructed in 1899 by P.F. McCann, a contractor for the Hostetter-Connellsville Coke Company. No other information was found regarding the construction of this dam.

2.3 MODIFICATION/REPAIR

At the direction of the Water Supply Commission of Pennsylvania, modifications were made to the Whitney Ridge Dam in 1915 that included:

(1) Increasing the spillway capacity to 1500 cfs (450 cfs/sq. mi.); and

(2) Installing of a seepage monitoring weir.

Additional modifications were made in 1921, including:

(3) Installation of concrete "seepage cutoff" walls in the downstream slope. The walls were reportedly four to six feet deep.

(4) Leveling of the embankment crest.

A state inspection report dated 15 October 1928 indicated that an embankment grouting program had been implemented by the owner the previous year. In particular, a "soft" layer, twelve feet below the embankment crest, had been grouted with apparent success.

Throughout the life of the structure, various repairs and maintenance activities have been recommended by the state, including crest leveling, seepage control, spillway repair, and clearing of embankment surfaces of trees and brush. Besides the above noted modifications, the only documented repair and maintenance occurred in the spring of 1972 when the embankment surfaces were cleared and the spillway repaired.

2.4 OPERATION

The dam was designed to operate without a dam tender and no operational data is available. Operating procedures for the two pipelines that comprise the outlet works are unknown. No records of operation and maintenance were available.

2.5 EVALUATION

a. Availability: Engineering data was provided by PennDER, Bureau of Dams and Waterway Management.

b. Adequacy: The available engineering information, though greatly limited, was supplemented by field inspections and supporting engineering analyses and is considered adequate for the purpose of this Phase I inspection report.

c. Validity: Based on the review of the available information, there appears to be no reason to question the validity of the limited engineering data.

SECTION 3
VISUAL INSPECTION

3.1 FINDINGS

a. General: The visual observations of Whitney Ridge Dam and reservoir were performed on 28 November 1979 and 4 June 1980, and consisted of:

- (1) Visual observations of the embankment crest and slopes, groins and abutments;
- (2) Visual observations of the spillway including weir wall, training wall, approach and discharge channels.
- (3) Visual observations of the embankment's downstream toe area including the pond drain discharge channel, seepage conditions and the remains of the valve house.
- (4) Visual observations of downstream conditions and evaluation of the downstream hazard potential.
- (5) Visual observations of the reservoir shoreline and inlet stream channel.
- (6) Transit stadia survey of relative elevations along the embankment crest centerline, spillway, and across the embankment slopes.

The visual observations were made during periods when the reservoir and tailwater were at normal operating levels.

The visual observations checklist and field plan containing the observations and comments of the field inspection team are contained in Appendix A. Plate III in Appendix E contains the stadia survey data including dam plan, profile and sections. Specific observations are illustrated on photographs in Appendix C. Detailed findings of the visual inspection are presented in the following sections.

b. Embankment:

- (1) Crest: The embankment crest was observed to be generally level although locally uneven in places, sloping frequently toward the reservoir. The transit survey of the crest indicated a low point of Elev. 1188.2 which was 1.8 feet below the top of the spillway training wall.

Horizontally, the embankment crest was observed to be a portion of a circular arc having central angle of approximately 90°. The width of the embankment crest was approximately 10 feet.

The embankment crest was generally grass and brush covered and contained a foot path. No cracking or settlement of the embankment crest were observed.

(2) Upstream Slope: The upstream slope was entirely covered with riprap, which appeared to be generally uniform in coverage. No significant areas of erosion were observed on the upstream slope although considerable vegetal growth including small trees and woody vegetation cover the upstream slope of the embankment.

(3) Downstream Slope: The embankment's downstream slope was covered with brush, weeds and trees that made detailed observation of the embankment surface somewhat difficult.

The lower 25 percent of the embankment slope was covered with a generally uniform covering of rock riprap erosion protection. No significant erosion or displacement of the riprap was observed.

The tops of two concrete walls were observed discontinuously at and above midheight of the embankment through the central portion of the dam. The concrete surfaces observed appeared to be suffering some minor disintegration but appeared to be generally intact. Near the left abutment, a small amount of seepage was observed flowing over the top of the lower concrete wall. Embankment soil conditions in the vicinity of both walls were generally moist.

The embankment's downstream slope was generally uniform although local undulations and unevenness existed. No significant indication of slope instability was observed anywhere on the downstream slope.

Two animal burrows were observed near the crest of the slope.

c. Groins: Both groins (junction of embankment and abutment) were observed to be in reasonably good condition though some minor erosion has occurred in the left groin, apparently due to surface runoff from the steep abutment slope above.

The right groin and toe area of the embankment contain a V-shaped diversion channel that runs from the right end of the embankment to the valve house foundation near the left end of the dam. The channel is rock lined on the embankment side and was generally dry on the date of observation. The channel did not appear to ever have contained significant flows. No standing or seeping water was observed in the channel.

d. Abutments:

(1) Left: The left abutment beyond the crest of the dam is a relatively steep slope that rises to State Route 982 above. The abutment, both above the dam and below, is heavily wooded and did not appear to be suffering any instability. A pathway from Route 982 to the crest of the dam traverses the left abutment and has suffered some erosion due to surface runoff. Some eroded material has been deposited on the crest but is generally overgrown with brush and weeds.

Below the crest of the dam, no seepage or indication of instability was noted on the lower left abutment.

(2) Right: The right abutment is generally flat, heavily wooded, and contains numerous springs.

The active discharge channel passes along the right abutment and in the vicinity of the crest. The slope is generally grassed and stable. Below the concrete weir, the creek channel cuts into the right abutment and some erosion has occurred as described below.

e. Outlet Works:

(1) Pond Drain: A 12 inch (nominal) diameter cast iron pipe with gate valve outlets approximately 100 feet below the dam near the left abutment. The pipe was dry and no handwheel was available to activate the gate valve. Origin of the pipeline is unknown but the outlet point lies directly below the valve house foundation described below.

The pond drain invert is located in a small pool whose discharge channel leads to the creek channel below the dam.

The intake structure for the pond drain was not observed because of the reservoir pool level.

(2) Water Supply Facility: A valve house foundation containing three standard valve stem risers lies at the toe of the embankment near the left end of the dam. The gate valve nuts were visible in the valve stem housings but operating hardware was not available. The arrangement of water supply pipes could not be determined but the previously described pond drain lies immediately below the valve house foundation.

A six inch diameter cast iron pipe flowing approximately half full was observed to discharge to the creek channel near the spillway toward the right end of the dam. The alignment of the pipe suggested that it might originate at the valve house foundation.

An intake structure or structures was not observed because of the reservoir pool level and there was no indication of upstream flow controls.

f. Principal Spillway:

(1) General Configuration: The principal spillway for Whitney Ridge Dam is an ungated, open channel on the right abutment. The channel has a stone and mortar training wall on the left (embankment side) that protects the right end of the embankment.

The base of the principal spillway is generally uneven such that normal discharge is via an active discharge channel that lies at the right end of the spillway. Normal and small storm flows pass through this discharge channel and over a concrete wall at the downstream end of the channel. This concrete wall extends across the entire width of the spillway and provides for erosional stability for both normal and flood flows in the spillway.

(2) Approach Channel: The approach channel to the spillway is generally clogged with small trees and woody vegetation. Flow resistance in this portion of the channel is quite high. Only the previously described active discharge channel is unobstructed.

(3) Weir Wall: The concrete wall described above is functional at the right end of the spillway but somewhat deteriorated. Along portions of the spillway channel, only the top of the wall could be observed.

At the left end of the spillway, a portion of the wall has been exposed and undercut and was observed to be in a reasonably deteriorated condition.

Large flows appear to have passed over the wall in this general vicinity with resulting erosion and displacement of rock, both above and below the weir wall.

(4) Discharge Channel: Discharge from the active discharge channel below the concrete wall has caused some general erosion of valley alluvial materials. The discharge channel in this vicinity is approximately 15 feet wide and ranges from 8 to 10 feet deep, being eroded into the original ground.

On the left portion of the spillway below the overflow wall, considerable displacement of rock and hand placed stone has occurred, apparently due to flood flows through that portion of the spillway. The channel below the overflow wall joins the discharge channel approximately 25 feet below the concrete wall. Some debris and considerable erosion of alluvial materials has occurred in this area.

(1) Toe Area: The discharge channel crosses the valley bottom below the dam and roughly parallels the toe of the embankment. The channel consists of a steep sided erosional cut into the valley bottom.

Toward the left end of the dam the channel leaves the erosional cut and flows onto the original floodplain below. In this area, considerable deposition of rock, duntimber, and debris has occurred from flows in the recent past.

g. Instrumentation: No instrumentation was observed during the inspection.

h. Downstream Conditions:

(1) Seepage: Near the left end of the embankment, and adjacent to the lower left abutment, some seepage was occurring and marshy conditions existed. The wet area was generally between the valve house foundation and the left valley wall and extended from the toe of the embankment down past the pond drain outlet.

(2) Downstream Channel: Below the pond drain discharge channel, the creek channel turns down valley along the left valley wall. The initial reach below the dam is heavily wooded.

(3) Floodplain Development: Five inhabited dwellings lie on the creek's floodplain or the floodplain of Ninemile Run in the first two miles below the dam. The confluence of the unnamed creek and Ninemile Run is one mile below the dam.

i. Reservoir:

(1) Shoreline: The left reservoir shoreline is generally quite steep and heavily wooded. Some minor instability of an erosional nature was observed with some minor dountimber along the shore. No significant slope instability problems were observed along the left shoreline.

The right shoreline is quite flat along the entire length of the reservoir. Numerous streams and springs were observed to discharge directly to the reservoir along the right shoreline.

(2) Inlet Streams: Two streams enter Whitney Ridge reservoir at the upstream end. On the left, an older, relatively slow flowing stream enters the reservoir along the steep left valley wall.

On the right, a more rapidly flowing stream traverses the right reservoir slope, turns and enters the reservoir at the upstream end. This stream appears to be more recent in nature and erosional depositions and sediments were observed in the channel.

(3) Sedimentation: Considerable sedimentation of the upper end of the reservoir has occurred both in recent and past time. Deltaic development is extensive. Both stream channels pass through such delta type deposits which are generally overgrown and densely covered with brush. Recent sedimentation was observed particularly in the vicinity of the right stream channel.

(4) Watershed: The watershed contributing to Whitney Ridge reservoir was observed to be more or less as indicated on the U.S.G.S. topographic map. The watershed consists of woodland, farmland and pasture and no significant construction or mining activities were observed on the date of inspection.

3.2 EVALUATION

a. Embankment: The Whitney Ridge Dam embankment is considered to be in poor condition. This assessment is based on the following visual observations:

(1) Visual indications of a high groundwater level in the embankment.

(2) Uncontrolled seepage conditions at the toe of the embankment near the left abutment.

(3) Dense vegetation on the crest and slopes, including large trees on the downstream slope.

(4) Uneven crest conditions with a low point 1.8 feet below the top of the spillway training wall.

(5) Animal burrows, erosion of slopes and a general lack of maintenance of the embankment.

b. Outlet Works: The condition of the outlet works, including pond drain and water supply facilities, could not be assessed because of the inability to locate system components or operate observed controls. This is considered to be a deficiency.

No indication of upstream flow controls was observed and this is considered to be a deficiency.

c. Principal (and Emergency) Spillway: The condition of the principal and emergency spillway is considered to be poor. This is based on visual observations of:

(1) Dense growth of trees and brush in the approach channel

(2) Deteriorated erosion protection facilities including the concrete wall overflow weir and channel bottom paving.

(3) Deteriorated and eroded conditions of the discharge channel.

d. Hazard Classification: The hazard classification for Whitney Ridge Dam is considered to be "high" based on observations of downstream floodplain development conditions.

SECTION 4 OPERATIONAL FEATURES

4.1 PROCEDURE

The reservoir pool level is normally maintained by the broadcrested, uncontrolled overflow weir of the principal spillway. Normal operation does not require a dam tender. There is no information available concerning the location or operability of the outlet works or procedures for their operation.

4.2 MAINTENANCE OF DAM

No planned maintenance schedule is on record. Observations indicate that maintenance procedures are poor.

4.3 INSPECTION OF DAM

The owners are required by the State of Pennsylvania to inspect the dam annually and make needed repairs.

4.4 WARNING SYSTEM

There is no known warning system or formal emergency procedure to alert and evacuate downstream residents upon threat of a dam failure.

4.5 EVALUATION

Lack of information on location, condition, and operating procedures for outlet works components is considered to be a deficiency.

Lack of warning system/emergency plan is considered to be a deficiency.

Maintenance of the dam and appurtenances is assessed to be poor. The recommendations presented in Section 7 should be implemented as part of a general maintenance and surveillance program at the dam.

SECTION 5
HYDROLOGY/HYDRAULICS

5.1 EVALUATION OF FEATURES

a. Design Data: The Whitney Ridge Dam has a watershed of 1,408 acres which is primarily pasture and woodland. The watershed is about one and one half miles long and one mile wide and has a maximum elevation of 2,170 feet (MSL). At normal pool the dam impounds a reservoir with a surface area of 6.4 acres and a storage volume of 55 acre-feet. Normal pool level is maintained at Elev. 1185.0 by the broadcrested weir of the principal spillway.

The principal spillway was originally constructed with sufficient capacity to pass 805 cfs which was estimated to be 230 cfs/square mile of watershed. The spillway was enlarged in 1915 to provide a discharge capacity of 1500 cfs or 430 cfs/sq. mi. of watershed.

There are no hydrologic calculations available relating reservoir/spillway performance to the Probable Maximum Flood or fractions thereof.

b. Experience Data: There are no records available of rainfall amounts or reservoir levels.

c. Visual Observation: On the date of the field reconnaissance, the spillway channel was overgrown with trees and brush which could cause blockage of the spillway during large storms resulting in possible unnecessary overtopping of the embankment.

d. Overtopping Potential: Overtopping potential was investigated through the development of the Probable Maximum Flood (PMF) for the watershed and the subsequent routing of the PMF and fractions of the PMF through the reservoir and spillway. The Corps of Engineers guidelines recommend 0.5 to 1 times the Probable Maximum Flood (PMF) for "small" size, "high" hazard dams. Based on observed downstream conditions, Whitney Ridge Dam has a Spillway Design Flood (SDF) of 0.5 PMF.

Hydrometeorological Report No. 33 indicates the adjusted 24 hour Probable Maximum Precipitation (PMP) for the subject site is 19.2 inches. No calculations are available to indicate whether the reservoir and spillway are sized to pass a flood corresponding to one half of the runoff from 19.2 inches of rainfall in 24 hours. Consequently, an evaluation of the reservoir/spillway system was performed to determine whether the dam's spillway capacity is adequate under current Corps of Engineers guidelines.

The Corps of Engineers, Baltimore District, has directed that the HEC-1 Dam Safety Version computer program be utilized. The program was prepared by the Hydrologic Engineering Center (HEC), U.S. Army Corps of Engineers, Davis, California. The major methodologies and key input data for this program are discussed briefly in Appendix D.

The peak inflow to Whitney Ridge Dam was determined by HEC-1 to be 3,700 cfs for a full PMF. The peak inflow for the SDF was determined to be 1,885 cfs.

An initial pool elevation of 1185.0 was assumed prior to commencement of the storm.

According to the HEC-1 analysis, at 0.50 PMF, Whitney Ridge Dam is overtopped by a maximum of 0.22 feet of water for a duration of 2 hours. The analysis is included in Appendix D.

e. Spillway Adequacy: The capacity of the combined reservoir and spillway system was determined to be 0.45 PMF by HEC-1. According to Corps of Engineers' guidelines, Whitney Ridge Dam's spillway is "inadequate."

At 0.50 PMF, Whitney Ridge Dam is overtopped by 0.22 feet of water for two hours. In the opinion of the evaluating engineer this depth and duration of overtopping would not cause failure of the embankment. This is based on the computed flow depth and duration data, soil type, firmness and vegetal cover conditions. An overtopping depth of at least one foot above the minimum elevation of the dam was judged by the engineer to be necessary to cause failure of the dam. Consequently, a downstream routing and breach analysis were not performed.

Therefore, in accordance with Corps of Engineer Guidelines, the spillway is rated as "inadequate" but not "seriously inadequate".

SECTION 6
STRUCTURAL STABILITY

6.1 AVAILABLE INFORMATION

a. Design and Construction Data: All available design documentation, calculations and other data received from the Pennsylvania Department of Environmental Resources were reviewed. There is no design or construction data available for this dam.

b. Operating Records: There are no written operating records or procedures for this dam.

c. Modifications: Several modifications have been made to Whitney Ridge Dam including enlarging the spillway and efforts to reduce embankment seepage conditions. The later modifications, which included construction of embedded concrete cutoff walls and injection grouting, are described in Section 2.

d. Visual Observations:

(1) Embankment: The visual observations, although limited by brush, weeds and trees, indicated no strong evidence of potential embankment instability. The downstream slope was generally uniform though local undulations and unevenness were noted. The upstream slope was entirely covered with riprap, no significant eroded areas were observed.

(2) Seepage: The tops of two concrete walls were observed discontinuously at and above midheight of the embankment's downstream slope. Near the left abutment, a small amount of seepage was observed flowing over the top of the lower concrete wall.

The downstream toe area near the left abutment was observed to be swampy and numerous seepage sources were observed.

(3) Principal Spillway: The concrete wall that maintains the principal spillway overflow crest was observed to be undercut, eroded and disintegrated along a significant portion of the left end of the spillway crest. Erosion of the wall but less disintegration has occurred at the right end of the channel where the active discharge channel flows.

The embankment side training wall, though deteriorated by age, was in functional condition.

e. Design Documents: The design documentation was, by itself, considered inadequate to evaluate the structure. There were no structural calculations associated with the stability of the embankment or of the appurtenant structures.

f. Performance: Numerous inspection reports cite serious embankment and foundation seepage conditions. One report, in 1919, noted "signs of slipping" as a result of the saturated embankment conditions. Installation of the concrete "cutoff walls" in 1921 was reported to have stabilized the slope.

6.2 EVALUATION

a. Embankment: The margin of safety against slope failure of Whitney Ridge Dam may be less than required by current Corps of Engineers guidelines. This assessment is based on visual observations of embankment and foundation seepage, embankment geometry and material conditions, and a review of the history of the embankment.

b. Principal Spillway: Based on visual observations, the principal spillway appeared to have less than adequate structural capability. This is based on the observed undercutting and general deterioration of the concrete overflow wall, and an observed sinkhole and deteriorated and unprotected channel bottom conditions between the wall and the reservoir.

c. Seismic Stability: According to the Seismic Risk Map of the United States, Whitney Ridge Dam is located in Zone 1 where damage due to earthquake would most likely be minor.

A dam located in Seismic Zone 1 may be assumed to present no hazard from an earthquake provided static stability conditions are satisfactory and conventional safety margins exist. Since there is concern regarding the static stability of the embankment, the seismic stability is questionable and should be assessed as part of the investigations recommended in Section 7.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS

7.1 ASSESSMENT

a. Evaluation:

(1) Embankment: Whitney Ridge Dam's embankment is considered to be in poor condition. This assessment is based on visual observations of groundwater and uncontrolled seepage conditions, dense vegetation on the crest and slopes, including large trees on the downstream slope, uneven crest conditions, and animal burrows, erosion of slopes and a general lack of maintenance of the embankment.

(2) Outlet Works: The condition of the outlet works including pond drain and water supply facilities, could not be assessed because of the inability to locate system components or operate observed controls. This is considered to be a deficiency.

No indication of upstream flow controls was observed and this is considered to be a deficiency.

(3) Principal (and Emergency) Spillway: The condition of the principal (and emergency) spillway is considered to be poor. This is based on visual observations of dense growth of trees and brush in the approach channel, deteriorated erosion protection facilities including the concrete wall overflow weir and channel bottom paving, and deteriorated and eroded conditions of the discharge channel.

(4) Flood Discharge Capacity: The principal (and emergency) spillway discharge capacity is assessed to be "inadequate." This is based on hydrologic/hydraulic computations using the HEC-1 Dam Safety Version computer program, that indicated the existing reservoir/spillway system is capable of passing 0.45 PMF. At 0.5 PMF, the embankment is overtopped by a maximum 0.22 feet for a duration of 2 hours. In the opinion of the evaluating engineer, this amount of overtopping is not sufficient to cause failure of the embankment.

(5) Downstream Conditions: Based on the results of the visual observations and the hydrologic/hydraulic computations, the lack of an emergency warning and operation plan is considered to be a deficiency.

b. Adequacy of Information: The available information and the observations made during field inspections of the dam are considered sufficient for purposes of the Phase I inspection report.

c. Urgency: The recommendations presented in Sections 7.2a through 7.2c should be implemented immediately.

d. Necessity for Additional Data/Evaluation: Additional engineering information is required to adequately evaluate and improve the structural stability and hydraulic performance of the facilities.

7.2 RECOMMENDATIONS

a. Additional Investigations: It is recommended that the owner immediately retain the services of a registered professional engineer knowledgeable and experienced in the design and construction of earth dams and masonry spillways to provide a detailed engineering investigation of Whitney Ridge Dam. This investigation should include but not be limited to the following:

(1) Detailed evaluation of spillway capacity and stability and development of recommendations for remedial action.

(2) Detailed investigation of the seepage and swampy conditions and structural stability of the embankment.

(3) Investigation of the outlet works with specific recommendations on making it operable and including provisions for upstream flow control.

b. Emergency Operation and Warning Plan: Concurrent with the additional investigations recommended above, the owner should develop an Emergency Operation and Warning Plan including:

(1) Guidelines for evaluating inflow during periods of heavy precipitation or runoff.

(2) Procedures for around the clock surveillance during periods of heavy precipitation or runoff.

(3) Procedures for drawdown of the reservoir under emergency conditions.

(4) Procedures for notifying downstream residents and public officials, in case evacuation of downstream areas is necessary.

c. Remedial Work: The Phase I Inspection of Whitney Ridge Dam also disclosed several deficiencies which should be performed immediately by the owner.

(1) Raise the embankment crest to design elevation.

(2) Remove trees and root systems with a diameter greater than 1/2 inch from the embankment and groins. This work should be performed under the direction of a professional engineer, knowledgeable in dam design and construction.

(3) Closely mow the embankment slopes, crest, groins, abutments and immediate downstream areas. Remove the cuttings from the site.

(4) Locate and backfill completely, all animal burrows on the embankment, groins and adjacent abutment areas.

(5) Replace lost riprap along the upstream slope of the embankment.

(6) Remove boulders, trees, downtimber and debris from the principal spillway approach and discharge channel.

(7) Develop and implement formal maintenance and inspection procedures.

d. Orderly Breaching: In lieu of performing the above recommendations, the owner should engage the services of a professional engineer, knowledgeable in dam design and performance, to prepare specifications for breaching the structure, to make it incapable of impounding water. The structure should then be breached under the direction of the professional engineer and in accordance with applicable state and local regulations.

APPENDIX A
VISUAL INSPECTION CHECKLIST

VISUAL OBSERVATIONS CHECKLIST I
(NON-MASONRY IMPOUNDING STRUCTURE)

Name Dam Whitney Ridge County Westmoreland State Pennsylvania National ID # PA 00474

Type of Dam Earth Hazard Category High
Date (s) Inspection 28 November 1979 Weather Cloudy, cool Temperature 45°F
4 June 1980 Cloudy, warm 70°F

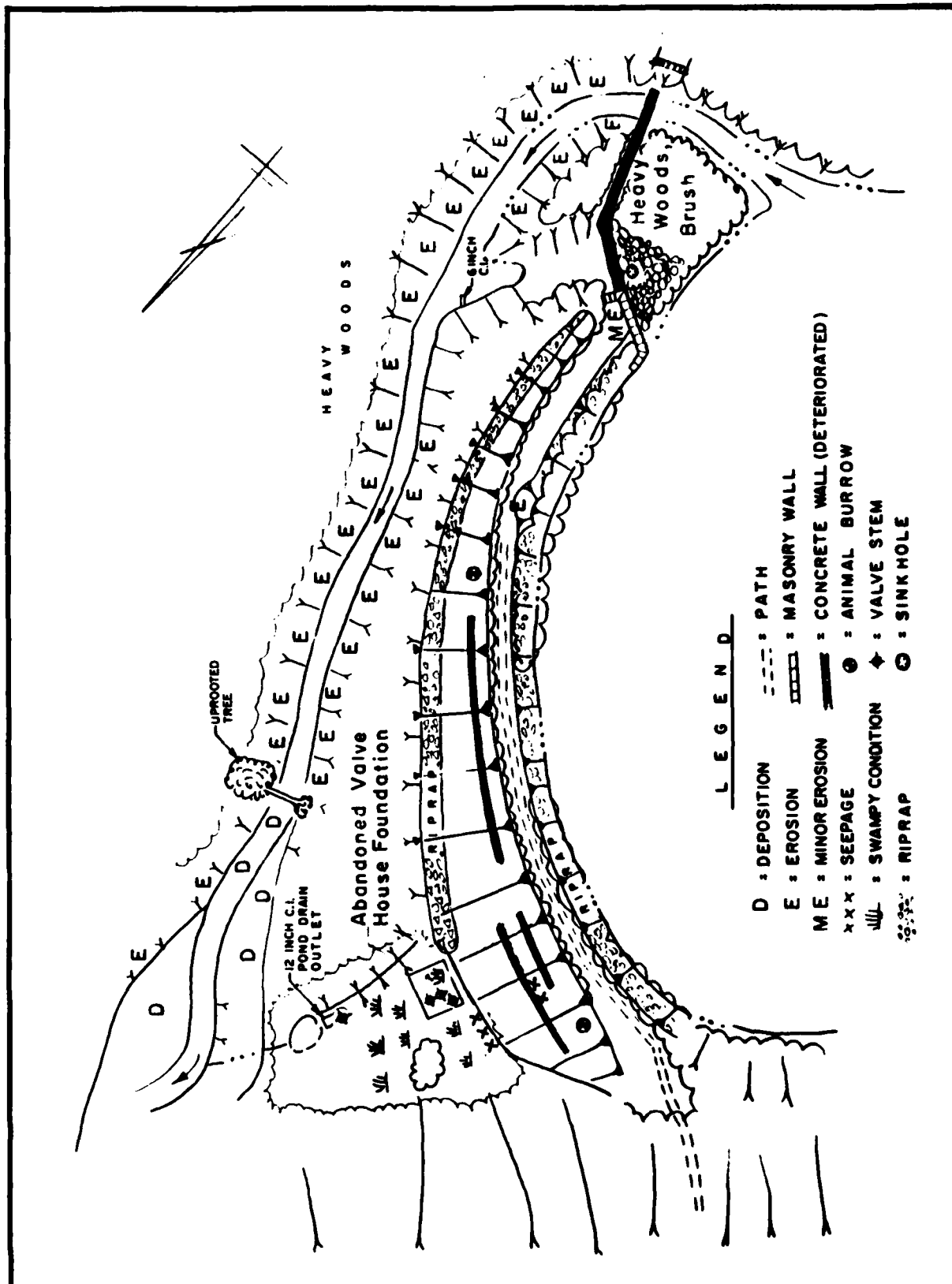
Pool Elevation at Time of Inspection 1185.0 (MSL)
Tailwater at Time of Inspection Unknown

Inspection Personnel: J. E. Barrick, P.E.* Ackenheil & Associates, Hydrologist and Project Manager.
J. P. Hannan Ackenheil & Associates, Geotechnical Engineer
S. G. Mazzella Ackenheil & Associates, Civil Engineer
J. B. Zeppieri Ackenheil & Associates, Geologist
Henry Fitz Westmoreland County Engineer
Tom Malesky Westmoreland County Engineer's Office

Recorder J. E. Barrick

GEO Project G79153-P
PennDER I.D. No. 65-24

*Returned on 4 June 1980



DATE: JULY 1980

SCALE: NONE

DR: JF

CK: JEB

WHITNEY RIDGE DAM

NATIONAL DAM INSPECTION PROGRAM

A. C. ACKENHEIL & ASSOCIATES, INC.
CONSULTING ENGINEERS
PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.

FIELD
PLAN

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed - Crest of embankment generally grass and brush cover. Some minor erosion of crest noted near spillway training wall.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	No significant erosion of embankment slopes, either upstream or downstream, observed. On the left abutment, an approach path in the abutment hillside has suffered some erosion with some deposition of earth and gravel materials on the left end of the embankment. The erosion is long standing and does not appear to present a problem to the dam.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Visual inspection indicates that the crest of the embankment is generally level, although it is locally uneven and somewhat rounded in cross-section. In plan, the crest of the embankment conforms to a circular arc of approximately 90°. At the left, the crest intersects a relatively steep abutment slope that is heavily wooded. At the right abutment, the crest of the embankment consists of principal spillway channel that lies in and on the right abutment.	

EMBANKMENT (CONTINUED)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
RIPRAP FAILURES	<p>The upstream slope of the embankment has a generally uniform and relatively undisturbed covering of rock riprap erosion protection. The riprap is heavily overgrown by small trees and brush but appears to be generally uniform across the entire length of the embankment.</p> <p>The downstream toe of the embankment is covered with rock riprap materials approximately 25% of the way up the slope. The riprap covering is generally uniform and does not appear to have suffered any erosional distress. It is overgrown with trees and small brush but appears to be generally intact.</p>	
SETTLEMENT	None observed.	
JUNCTION OF EMBANKMENT AND ABUTMENT SPILLWAY AND DAM	<p>The junction of the left end of the embankment and the abutment on the downstream slope was generally overgrown with brush, trees and dense grass. Some minor erosion was observed due principally to surface runoff from the abutment hillside beyond. At the toe of the junction of the embankment and abutment, a small amount of water was observed to be seeping from beneath the riprap erosion protection.</p> <p>The junction of the spillway and the right abutment contains the reservoir's active discharge channel. The discharge channel is controlled by a concrete wall and flow is subcritical along original ground of the right abutment. Only minor erosion was observed above the concrete wall flow control.</p>	

EMBANKMENT (CONTINUED)

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
<u>ANY NOTICEABLE SEEPAGE</u>	<p>Considerable seepage was noted at and below the toe of the dam in the vicinity of the left abutment, primarily between the ruins of the valve house and the abutment slope. Considerable standing water, marshy conditions and some seeping water were observed in this area.</p> <p>A small seep was observed on the embankment toward the left end in the immediate vicinity of the top of the concrete core wall.</p> <p>Some minor seepage was observed in the rock debris that liners the emergency spillway channel below the concrete flow control wall.</p> <p>In general, seepage quantities were too small to estimate accurately.</p>	
<u>STAFF GAGE AND RECORDER</u>	None observed.	
<u>DRAINS</u>	<p>A toe drain channel exists along the perimeter of the downstream embankment toe. The ditch is V-shaped, approximately 1 to 2 feet deep and is protected on the embankment side by the previously described riprap erosion protection. The ditch did not contain any flowing water on the date of inspection and appeared to be generally a dry channel.</p>	

OUTLET WORKS

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	No conduit observed.	
INTAKE STRUCTURE	No intake structure observed.	
OUTLET STRUCTURE	A 12 inch cast iron pipe with gate valve was observed to discharge to a small pool approximately 75 feet below the toe of the embankment near the left and of the dam. No flow from the pipe was observed and no handwheel was available on the gate valve.	
OUTLET CHANNEL	The pond drain outlet channel discharges to the original creek channel below the dam. A low spot or stilling pool exists immediately below the pipe outlet and contains standing water with no apparent discharge. The channel is generally overgrown with brush, trees, small woody vegetation.	
EMERGENCY GATE	None observed.	
OUTLET WORKS CONTROLS	Three standard gate valve stem risers were observed inside the ruins of a foundation of an apparent original valve house. The structure was located near the left end of the embankment. The area was generally marshy and contained water standing in some places to a depth of 6 inches. The piping configuration could not be determined.	
	There was no indication of an upstream flow control.	

PRINCIPAL (AND EMERGENCY) SPILLWAY

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
APPROACH CHANNEL	<p>The principal spillway contains two main segments that provide for normal and emergency spillway discharges.</p> <p>On the right end of the spillway, an active discharge channel lies along the reservoir shoreline and provides for discharge of normal reservoir flows and maintenance of the reservoir pool level. The channel is approximately 10 feet wide and 18 inches deep. The channel terminates at a concrete wall overflow weir where discharge is to an erosional creek channel below.</p> <p>On both inspection dates, the active discharge channel was clear of debris.</p> <p>The second section of the principal spillway channel lies near the left end of the spillway adjacent to the training wall at the end of the embankment. In this area, the spillway channel bottom has been paved with rock riprap and flows over a segment of concrete wall into a rock and debris lined channel that discharges to the creek channel below. The crest of this portion of the spillway is 6 to 8 inches above normal pool level.</p> <p>In this area, the approach channel is overgrown with small trees and brush, presenting a very high flow resistance.</p> <p>The condition of the riprap is generally poor. Some erosion was observed and a large sinkhole exists near the spillway training wall.</p>	

PRINCIPAL (AND EMERGENCY) SPILLWAY (CONTINUED)

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
CONCRETE WEIR	The concrete wall that maintains the pool level is deteriorated severely in places, and is undercut in the left portion of the spillway.	
DISCHARGE CHANNEL	Between the two segments of spillway channel exists a flat area that is heavily overgrown with brush and trees and appears to have a grass lining. The creek channel below the overflow weir has suffered some erosion of both creek banks and is partially clogged by duntimber and debris. Creek channel in this area is approximately 15 feet wide, 10 feet deep.	
BRIDGE AND PIERS	None observed.	

INSTRUMENTATION

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
MONUMENTATION/SURVEYS	None observed.	
OBSERVATION WELLS	None observed.	
WEIRS	None observed.	
PIEZOMETERS	None observed.	
OTHER		

RESERVOIR

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
<u>SLOPES</u>	<p>The slopes adjacent to the left side of the reservoir are generally steep and heavily wooded. Some dountimber noted along the shoreline and some minor erosion. However, conditions appear to generally be stable over the long term. No significant slumping of the left shoreline was observed.</p> <p>The reservoir's right shoreline is bounded by generally very flat slopes that are also heavily wooded. Numerous small streams and springs discharge directly to the reservoir along the right shoreline.</p>	
<u>SEDIMENTATION</u>	<p>Considerable deltaic development was observed at the upper end of the reservoir. Some recent sediments noted but most sediments are quite old and generally covered with dense vegetal growth.</p>	
<u>INLET STREAMS</u>	<p>Two streams enter Whitney Ridge reservoir at the upstream end. On the left, a rather slow flowing stream approaches from a valley formed by the left reservoir slope. The stream was generally clear but contained considerable vegetation and trees on the shoreline.</p> <p>On the right, a more rapidly flowing stream enters the reservoir through a channel that passes down the right reservoir slope, turns, and enters the reservoir at the upstream end. This stream appears to be more recent in evolution than the left stream and deltaic development in this vicinity appears to be more recent.</p>	

RESERVOIR (CONTINUED)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
WATERSHED	<p>The watershed appears to be generally as indicated on the U.S.G.S. topographic map. The watershed contains pasture, farmland and woodland. No major construction or mining development was observed in the watershed.</p>	<p>The "County Reservoir" shown on the U.S.G.S could not be observed because the the access road was blocked.</p>

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	The immediate downstream channel consists of a recently formed creek channel that roughly parallels the downstream toe of the embankment. The channel begins below the overfall weir of the principal spillway.	
	The downstream channel flows through a relatively narrow steep sided erosional channel in the vicinity of the dam. Considerable bank erosion has occurred along the entire length of the upper end of the channel and significant deposition of rocks and sandy material is occurring downstream from approximately the middle of the embankment.	
	A significant amount of rock and debris deposition has occurred in the reach immediately above a large fallen walnut tree just left of the central portion of the embankment.	
	Below the fallen tree, the channel leaves its steep sided valley and enters a generally flat area that contains a significant amount of water, deposited rock, timber, down timber, trees, brush, etc. Significant flows appear to have passed through this area in the recent past. At this point also, the downstream channel begins to leave or turn away from the embankment toe.	

DOWNSTREAM CHANNEL (CONTINUED)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	<p>In the upper reach above the fallen trees, the channel slopes are quite steep, in some places vertical and show considerable exposed rock and alluvial materials.</p> <p>Below the fallen tree, the channel slopes are quite flat and generally ill defined as it passes through a heavily wooded area.</p>	
APPROXIMATE NO. OF HOMES AND POPULATION	Several homes lie on the floodplain in the first two miles below Whitney Ridge Dam.	

APPENDIX B
ENGINEERING DATA CHECKLIST

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Whitney Ridge Dam
I.D. No. PA 00474

ITEM	REMARKS
*Design Drawings	"Proposed Extension of Spillway of Whitney Reservoir", H. C. Frick Coke Company, 26 March 1915.
As-Built Drawings	None available.
Regional Vicinity Map	U.S.G.S. 7-1/2 Minute Mammoth, Pennsylvania Quadrangle Map.
*Construction History	Constructed in 1899 by P.F. McCann for Hostetter-Connellsville Coke Company; designed and constructed under the supervision of N.A. Barnhart, Engineer for Hostetter-Connellsville Coke Company.
Typical Sections of Dam	See Plate III, Appendix E.
*Outlets-Plan Details Constraints Discharge Ratings	Two pipes: 12 inch diameter cast iron pond drain; 8 inch diameter cast iron water supply; valve house at toe of dam.
Rainfall/Reservoir Records	None available.
*Design Reports	See "Report Upon the Whitney Ridge Dam of the H.C. Frick Coke Company" dated 7 January 1915.
Geology Reports	None available.
Design Computations	None available.

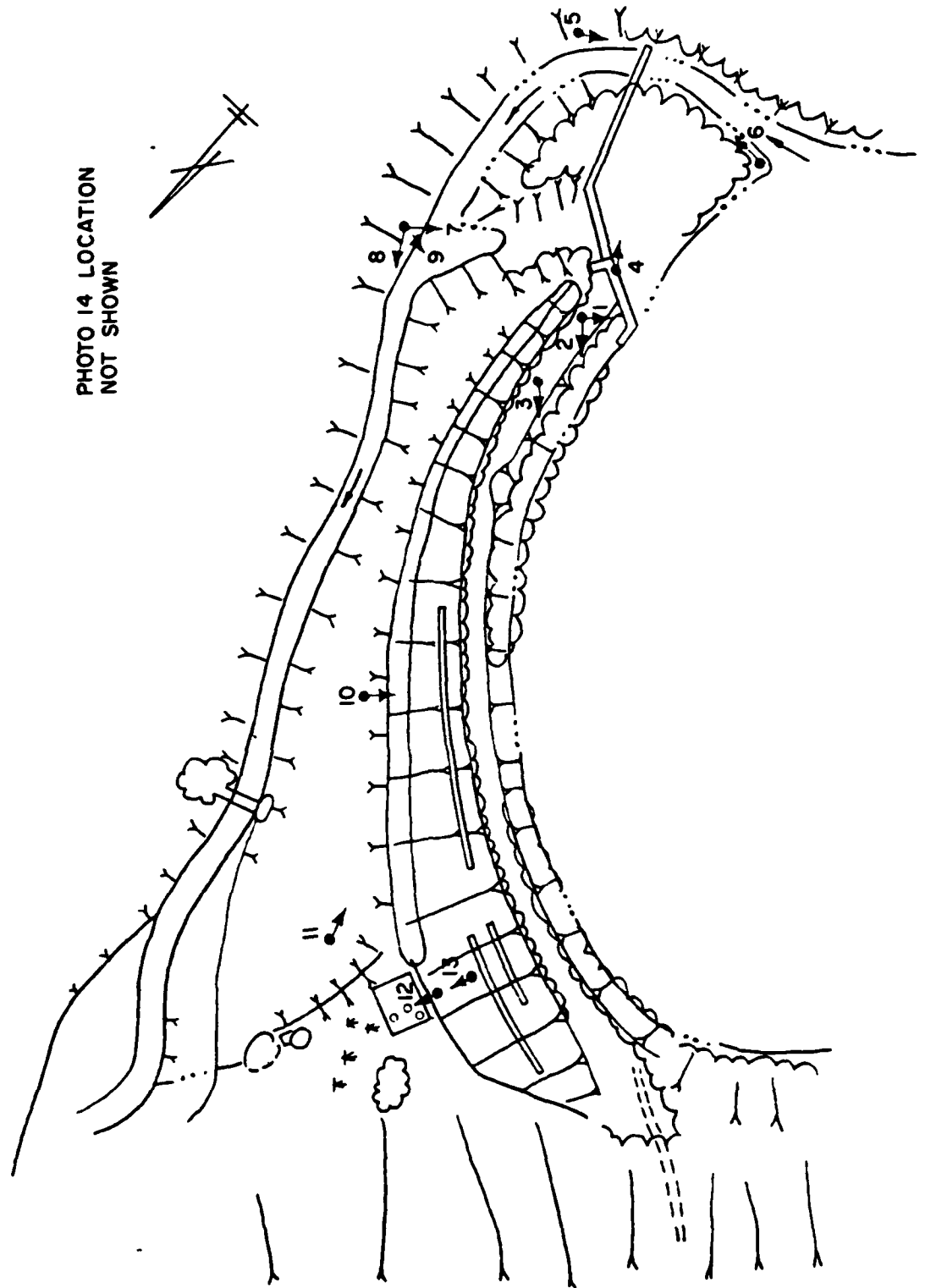
ITEM	REMARKS
*Hydrology and Hydraulics	Wasteway capacity calculations dated 3-31-15 and 6-30-16.
*Dam Stability	Report by State Inspector (6 June 1919) of "signs of slipping" due to seepage conditons.
*Seepage Studies	Reports of seepage by state inspectors continuously from 1915 to 1948.
Materials Investigations, Boring Records, Laboratory, Field	None available.
Post-Construction Surveys of Dam	None recorded.
Borrow Sources	Data not available.
*Monitoring Systems	Seepage monitoring weir installed 1915. Weekly readings taken from May 1915 through December 1916. Monthly readings record August 1917 and March 1920.
*Modifications	Spillway modification made in 1915. Three walls added to downstream slope to limit seepage added in 1921. Embankment grouted to reduce leakage, sometime in 1927.
High Pool Records	None available.
*Post-Construction Engineering Studies and Reports	See "Design Reports" above.

ITEM	REMARKS
*Maintenance, Operation, Records	Crest leveled in Spring 1921. Embankment cleared and spillway repaired, Spring 1972.
*Spillway Plan Sections Details	See Plate II and Plate III, Appendix E.
Operating Equipment Plans and Details	None available.
Specifications	None available.
*Miscellaneous	Fifteen inspection reports by Water Supply Commission of PA (predecessor to PennDER). One Inspection Report by dam owner to State dated 12 June 1924. Correspondence relating to the above inspection reports. Correspondence in relation to seepage weir readings. Correspondence in relation to spillway modification in 1915.
Prior Accidents or Failure of Dam Description Reports	None reported.

*Information and data may be obtained from the PennDER, Harrisburg, Pennsylvania.
 **Reduced size reproductions contained in Appendix E.

APPENDIX C
PHOTOGRAPHS

PHOTO 14 LOCATION
NOT SHOWN



DATE: JULY 1980

SCALE: NONE

DR: JF

CK:

WHITNEY RIDGE DAM
NATIONAL DAM INSPECTION PROGRAM

A. C. ACKENHEIL & ASSOCIATES, INC.
CONSULTING ENGINEERS
PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.

PHOTO
KEY
MAP

WHITNEY RIDGE DAM



PHOTO 1. RESERVOIR



PHOTO 2. UPSTREAM SLOPE

WHITNEY RIDGE DAM

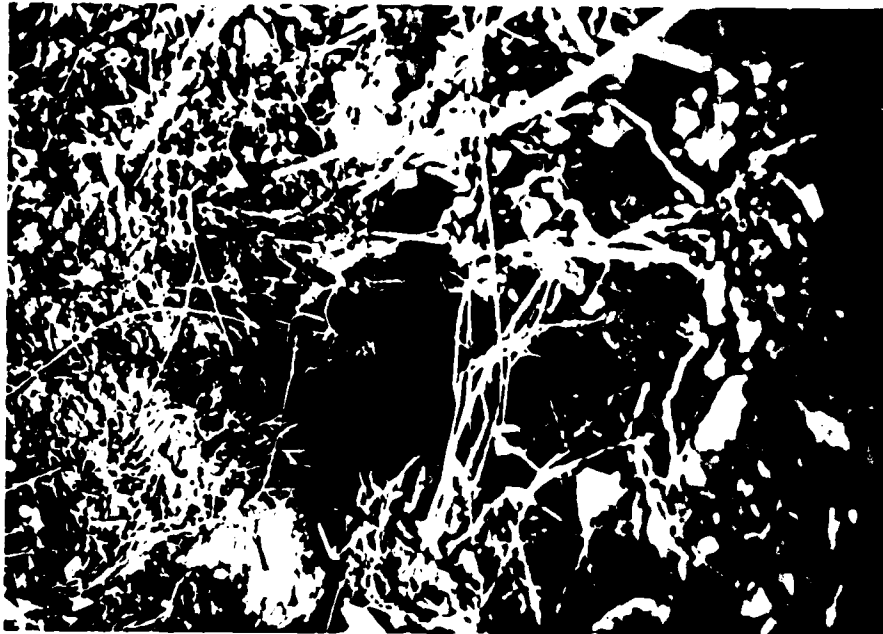


PHOTO 4. SINKHOLE



PHOTO 3. RIPRAP

WHITNEY RIDGE DAM



PHOTO 5. PRINCIPAL SPILLWAY OVERFLOW CREST



PHOTO 6. DISCHARGE CHANNEL

WHITNEY RIDGE DAM



PHOTO 8. DOWNSTREAM CHANNEL

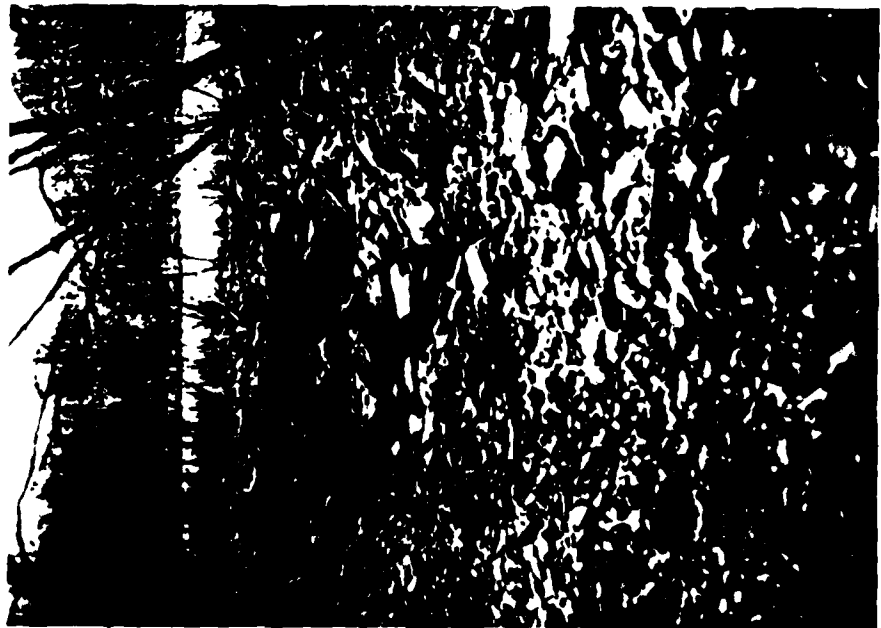


PHOTO 7. DISCHARGE CHANNEL

WHITNEY RIDGE DAM



PHOTO 9. OUTLET WORKS

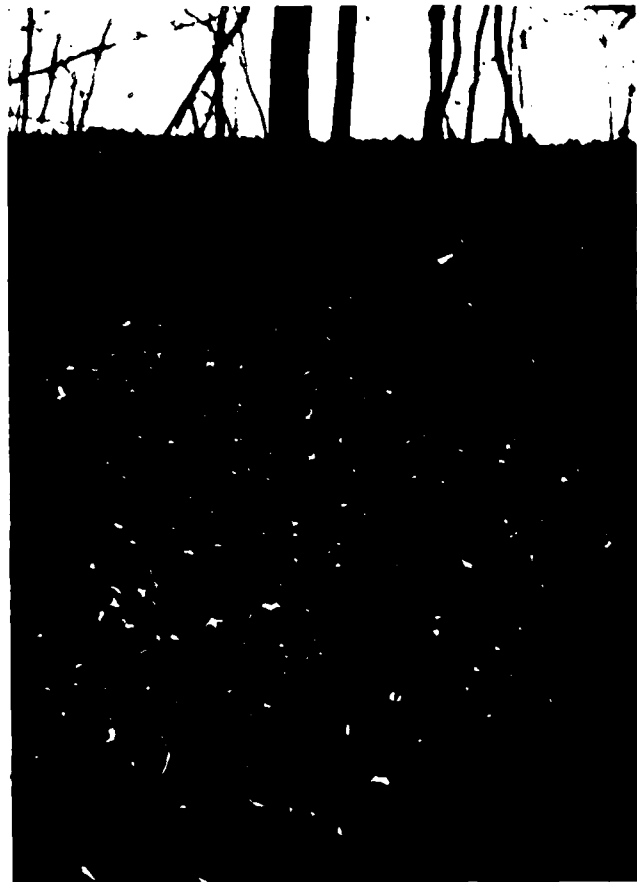


PHOTO 10. DOWNSTREAM SLOPE

WHITNEY RIDGE DAM



PHOTO 11. DOWNSTREAM SLOPE



PHOTO 12. OUTLET WORKS

WHITNEY RIDGE DAM



PHOTO 13. DOWNSTREAM HAZARD



PHOTO 14 DOWNSTREAM HAZARD

DETAILED PHOTO DESCRIPTIONS

- Photo 1 Reservoir as seen from crest of dam.
- Photo 2 Upstream Slope as seen from principal spillway.
- Photo 3 Riprap on upstream slope. Note vegetal growth.
- Photo 4 Sinkhole in principal spillway channel.
- Photo 5 Principal Spillway Overflow Crest as seen from downstream. Normal discharge from reservoir diverted by discharge channel at right abutment.
- Photo 6 Discharge Channel at right abutment end of principal spillway.
- Photo 7 Discharge Channel overflow section as seen from downstream.
- Photo 8 Downstream Channel immediately below discharge channel overflow section.
- Photo 9 Outlet Works pipe discharging to downstream channel below toe of dam.
- Photo 10 Downstream Slope as seen from embankment toe. Note exposed top of concrete cutoff wall.
- Photo 11 Downstream Slope looking to the right from near the left abutment.
- Photo 12 Outlet Works valve stems and valve house foundation.
- Photo 13 Downstream Hazard as seen from valve house foundation.
- Photo 14 Downstream Hazard.

APPENDIX D
HYDROLOGY AND HYDRAULICS
ANALYSES

APPENDIX D HYDROLOGY AND HYDRAULICS

Methodology: The dam overtopping analysis was accomplished using the systemized computer program HEC-1 (Dam Safety Version), July, 1978, prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California. A brief description of the methodology used in the analysis is presented below.

1. Precipitation: The Probable Maximum Precipitation (PMP) is derived and determined from regional charts prepared from past rainfall records including "Hydrometeorological Report No. 33" prepared by the U.S. Weather Bureau.

The index rainfall is reduced from 10% to 20% depending on watershed size by utilization of what is termed the HOP Brook adjustment factor. Distribution of the total rainfall is made by the computer program using distribution methods developed by the Corps.

2. Inflow Hydrograph: The hydrologic analysis used in development of the overtopping potential is based on applying a hypothetical storm to a unit hydrograph to obtain the inflow hydrograph for reservoir routing.

The unit hydrograph is developed using the Snyder method. This method requires calculation of several key parameters. The following list gives these parameters, their definition and how they were obtained for these analyses.

<u>Parameter</u>	<u>Definition</u>	<u>Where Obtained</u>
Ct	Coefficient representing variations of watershed	From Corps of Engineers*
L	Length of main stream channel	From U.S.G.S. 7.5 minute topographic map
Lca	Length on main stream to centroid of watershed	From U.S.G.S. 7.5 minute topographic map

Cp	Peaking coefficient	From Corps of Engineers*
A	Watershed size	From U.S.G.S. 7.5 minute topographic map

3. Spillway Hydraulics: Principal (and emergency) spillway flow control is assumed to be by broadcrested weir at the entrance to the spillway channel.

A low discharge coefficient "c" and a short crest length (right abutment flows neglected) provide a conservative analysis for large discharge conditions.

4. Routing: Reservoir routing is accomplished by using Modified Puls routing techniques where the flood hydrograph is routed through reservoir storage. Hydraulic capacities of the outlet works, spillways and the crest of the dam are used as outlet controls in the routing.

The hydraulic capacity of the outlet works can either be calculated and input or sufficient dimensions input and the program will calculate an elevation-discharge relationship.

Storage in the pool area is defined by an area-elevation relationship from which the computer calculates storage. Surface areas are either planimeted from available mapping or U.S.G.S. 7.5 minute series topographic maps or taken from reasonably accurate design data.

5. Dam Overtopping: Using given percentages of the PMF the computer program will calculate the percentage of the PMF which can be controlled by the reservoir and spillway without the dam overtopping.

*Developed by the Corps of Engineers on a regional basis for Pennsylvania.

HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Predominately pasture and
woodland. Rock quarry in watershed on Chestnut Ridge

ELEVATION TOP NORMAL POOL (STORAGE
CAPACITY): 1185.0 (55 acre-feet.)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE
CAPACITY): 1188.2 (79 acre-feet.)

ELEVATION MAXIMUM DESIGN POOL: Unknown

ELEVATION TOP DAM: 1188.2 (minimum)

OVERFLOW SECTION

- a. Elevation 1185.0
- b. Type Open Channel
- c. Width 110 feet
- d. Length N/A
- e. Location Spillover Right abutment
- f. Number and Type of Gates None

OUTLET WORKS

- a. Type 8 inch diameter water supply pipe
- b. Location Near left abutment
- c. Entrance Inverts Unknown
- d. Exit Inverts Unknown
- e. Emergency Drawdown Facilities 12 inch diameter pond drain

HYDROMETEOROLOGICAL GAGES

- a. Type None
- b. Location N/A
- c. Records None

MAXIMUM REPORTED NON-DAMAGING
DISCHARGE Unknown

HEC-1 DAM SAFETY VERSION
HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: Whitney Ridge Dam	NDI ID NO. PA 00474
Probable Maximum Precipitation (PMP)	24.0*
Drainage Area	2.2 sq. mi.
Reduction of PMP Rainfall for Data Fit	0.8 (24.0)
Reduce by 20%, therefore PMP rainfall =	=19.2 in.
Adjustments of PMF for Drainage Area (Zone 7)	
6 hrs.	102%
12 hrs.	120%
24 hrs.	130%
Snyder Unit Hydrograph Parameters	
Zone	24**
C _p	0.45
C _t	1.6
L	3.03 miles
L _{ca}	1.89 mile
$t_p = C_t (L \cdot L_{ca})^{0.3} =$	2.7 hours
Loss Rates	
Initial Loss	1.0 inch
Constant Loss Rate	0.05 inch/hour
Base Flow Generation Parameters	
Flow at Start of Storm	1.5 cfs/sq.mi=3.3 cfs
Base Flow Cutoff	0.05 x Q peak
Recession Ratio	2.0
Overflow Section Data	
Crest Length	110 feet
Freeboard	feet
Discharge Coefficient	2.63
Exponent	1.5
Discharge Capacity	1656 cfs

* Hydrometeorological Report 33

**Hydrological zone defined by Corps of Engineers,
Baltimore District, for determining Snyder's Coefficients
(C_p and C_t).

ACKENHEIL & ASSOCIATES
 GEO Systems, Inc.
 1000 Banksville Road
 PITTSBURGH, PA. 15216
 (412) 531-7111

Sheet _____ of _____
 Job Whitaker Reservoir Job No. 741032
 Subject DATA Input
 Made By THH Date 4/1/80 Checked _____ Date _____

LOSS RATE AND BASE FLOW PARAMETERS

As Recommended by Corp of Engineers, Baltimore District

STRCL = 1 inch
 CNSTL = 0.05 inch/hour
 STRTG = 1.5 cfs/mi²
 QRC SN = 0.05 (5% of Peak Flow)
 RTIOR = 2.0

ELEVATION-AREA-CAPACITY RELATIONSHIPS

FROM USGS. 7.5 min Quad, Ponded Files AND Field Inspection Data

AT Spillway Crest Elevation 1185.0

Initial Storage 55 Acre Feet

Pond Surface Area 6.4 ACRES

At elevation 1200 Area = 21 ACRES

From Conic Method of Reservoir Volume
 FLOOD Hydrograph Package (HEC-1)
 DAM Safety Version (USERS MANUAL)

$$H = 3V/A$$

$$H = 3(55)/6.4 = 25.8 \text{ feet}$$

ELEVATION Where Area Equals Zero:

$$1185.0 - 25.8 = 1159.2$$

USE BEST QUALITY PRACTICABLE
 MATERIALS TO BE USED

AREA	ΔA	0.0	6.4	21.0
ELEVATION	ΔE	1159.2	1185.0	1200.0

ACKENHEIL & ASSOCIATES
GEO Systems, Inc.
1000 Banksville Road
PITTSBURGH, PA. 15216
(412) 531-7111

Sheet _____ of _____
Job Whitney Ridge Dam Job No. 79153 F
Subject DATA Input
Made By JPH Date 6/1/90 Checked _____ Date _____

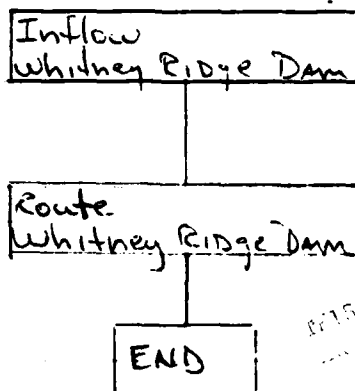
CURTOP PARAMETERS

Top of Dam Elevation (minimum)	1128.2
Length of Dam (Excluding Spillway)	500 feet.
Coefficient of Discharge "C"	3.09
ϕ_{Lmax} ϕ_{Vmax}	

Principal Spillway Parameters

Spillway Crest Elevation	1185.0
Length of Crest	110.0
Coefficient of Discharge "C"	2.63

Program Schedule



THIS PAGE IS BEST QUALITY PRACTICES
AND ONLY FORWARDED TO DBQ

 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION JULY 1978
 LAST MODIFICATION 26 FEB 79

1	A1	NATIONAL PROGRAM FOR THE INSPECTION OF NON FEDERAL DAMS										
2	A2	HYDROLOGIC AND HYDRAULIC ANALYSIS OF WHITNEY RIDGE DAM										
3	A3	PROBABLE MAXIMUM FLOOD PMF/UNIT HYDROGRAPH BY SNYDER'S METHOD										
4	B	300	0	30	0	0	0	0	0	0	-4	0
5	B1	5										
6	J	1	3	1								
7	J1	1.	.5	.2								
8	K	0	1					1				
9	K1	INFLOW HYDROGRAPH FOR WHITNEY RIDGE DAM										
10	M	1	1	2.2	2.2						1	
11	P		24	102	120	130						
12	T							1.0	.05			
13	W	2.7	.45									
14	X	-1.5	-0.05	2.0								
15	K	1	2					1				
16	K1	ROUTING AT WHITNEY RIDGE DAM										
17	Y			1	1							
18	Y1	1						55.				
19	\$A	0.	6.4	21.								
20	\$E	1159.2	1185.	1200.								
21	\$S	1185.0	110.	2.63	1.5							
22	\$D	1188.2	3.08	1.5	500.							
23	\$L	30.	90.	485.	535.							
24	\$V	1188.2	1189.	1190.	1191.							
25	K	99										
26	A											
27	A											
28	A											
29	A											
30	A											

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT	1
ROUTE HYDROGRAPH TO	2
END OF NETWORK	

 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION JULY 1978
 LAST MODIFICATION 26 FEB 79

RUN DATE: 9 JUN 80
 RUN TIME: 10.19.21

NATIONAL PROGRAM FOR THE INSPECTION OF NON FEDERAL DAMS
 HYDROLOGIC AND HYDRAULIC ANALYSIS OF WHITNEY RIDGE DAM
 PROBABLE MAXIMUM FLOOD PMF/UNIT HYDROGRAPH BY SNYDER'S METHOD

JOB SPECIFICATION									
NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	0	30	0	0	0	0	0	-4	0
			JOPER	NWT	LROPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
 NPLAN= 1 NRTIO= 3 LRTIO= 1
 RTIOS= 1.00 0.50 0.20

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH FOR WHITNEY RIDGE DAM

ISTAQ 1 ICOMP 0 IECON 0 ITAPE 0 JPLT 0 JPRT 0 INAME 1 ISTAGE 0 LAUTC 0

HYDROGRAPH DATA
IHYDG 1 IUHG 1 TAREA 2.20 SNAP 0.0 TRSDA 2.20 TRSPC 0.0 RATIO 0.0 ISNOW 0 ISAME 1 LOCAL 0

PRECIP DATA
SPFE 0.0 PMS 24.00 R6 102.00 R12 120.00 R24 130.00 R48 0.0 R72 0.0 R96 0.0

TRSPC COMPUTED BY THE PROGRAM IS 0.800

LOSS DATA
LROPT 0 STRKR 0.0 DLTKR 0.0 RTIOL 1.00 ERAIN 0.0 STRKS 0.0 RTIOK 1.00 STRTL 1.00 CNSTL 0.05 ALSMX 0.0 RTIMP 0.0

UNIT HYDROGRAPH DATA
TP= 2.70 CP=0.45 NTA= 0

RECESSION DATA
STRTQ= -1.50 QRCSN= -0.05 RTIOR= 2.00
UNIT HYDROGRAPH 49 END-OF-PERIOD ORDINATES, LAG= 2.70 HOURS, CP= 0.45 VOL= 1.00

16.	59.	120.	180.	223.	235.	220.	196.	174.	155.
138.	123.	109.	97.	87.	77.	69.	61.	55.	49.
43.	39.	34.	31.	27.	24.	22.	19.	17.	15.
14.	12.	11.	10.	9.	8.	7.	6.	5.	5.
4.	4.	3.	3.	3.	2.	2.	2.	2.	

END-OF-PERIOD FLOW
MO.DA HR.MN PERIOD RAIN EXCS LOSS COMP Q MO.DA HR.MN PERIOD RAIN EXCS LOSS COMP Q

SUM 24.96 23.08 1.88 66604.
(634.)(586.)(48.)(1886.02)

HYDROGRAPH ROUTING

ROUTING AT WHITNEY RIDGE DAM

ISTAQ 2 ICOMP 1 IECON 0 ITAPE 0 JPLT 0 JPRT 0 INAME 1 ISTAGE 0 LAUTC 0

ROUTING DATA
QLOSS 0.0 CLOSS 0.0 AVG 0.0 IRES 1 ISAME 1 IOPT 0 IPMP 0 LSTR 0

NSTPS 1 NSTDL 0 LAG 0 AMSKK 0.0 X 0.0 TSK 0.0 STORA 55. ISPRAT 0

SURFACE AREA= 0. 6. 21.
CAPACITY= 0. 55. 250.
ELEVATION= 1159. 1185. 1200.

CREL 1185.0 SPWID 110.0 COQW 2.6 EXPW 1.5 ELEV 0.0 COQL 0.0 CAREA 0.0 EXPL 0.0

DAM DATA
TOPEL 1188.2 COOD 3.1 EXPD 1.5 DAMWID 500.

CREST LENGTH 30. 90. 485. 535.
AT OR BELOW
ELEVATION 1188.2 1189.0 1190.0 1191.0

PEAK OUTFLOW IS 3702. AT TIME 18.50 HOURS

PEAK OUTFLOW IS 1844. AT TIME 18.50 HOURS

PEAK OUTFLOW IS 735. AT TIME 18.50 HOURS

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS		
				RATIO 1 1.00	RATIO 2 0.50	RATIO 3 0.20
HYDROGRAPH AT	1	2.20	1	3707.	1853.	741.
	(5.70)	(104.96)(52.48)(20.99)(
ROUTED TO	2	2.20	1	3702.	1844.	735.
	(5.70)	(104.82)(52.21)(20.82)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1	ELEVATION STORAGE OUTFLOW	INITIAL VALUE 1184.98 55. 0.	SPILLWAY CREST 1185.00 55. 0.	TOP OF DAM 1188.20 79. 1656.			
RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1189.79	1.59	94.	3702.	7.50	18.50	0.0
0.50	1188.42	0.22	81.	1844.	2.00	18.50	0.0
0.20	1186.86	0.0	68.	735.	0.0	18.50	0.0

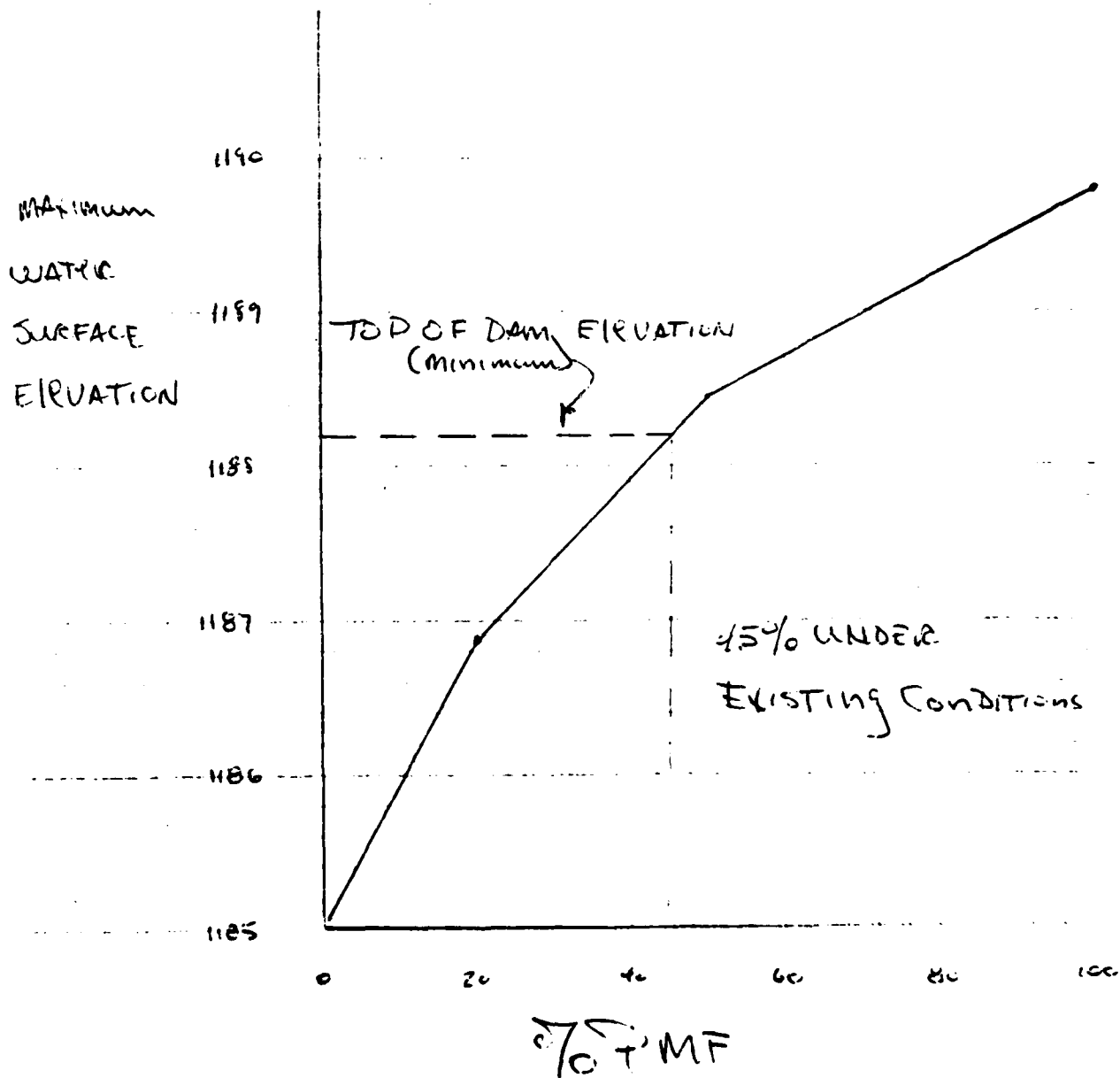
ACKENHEIL & ASSOCIATES
GEO Systems, Inc.
1000 Banksville Road
PITTSBURGH, PA. 15216
(412) 531-7111

Sheet _____ of _____

Job Whitney Ridge Dam Job No. 79153D

Subject Seepage & Reservoir Plot

Made By DATE Date 1/5/81 Checked _____ Date _____

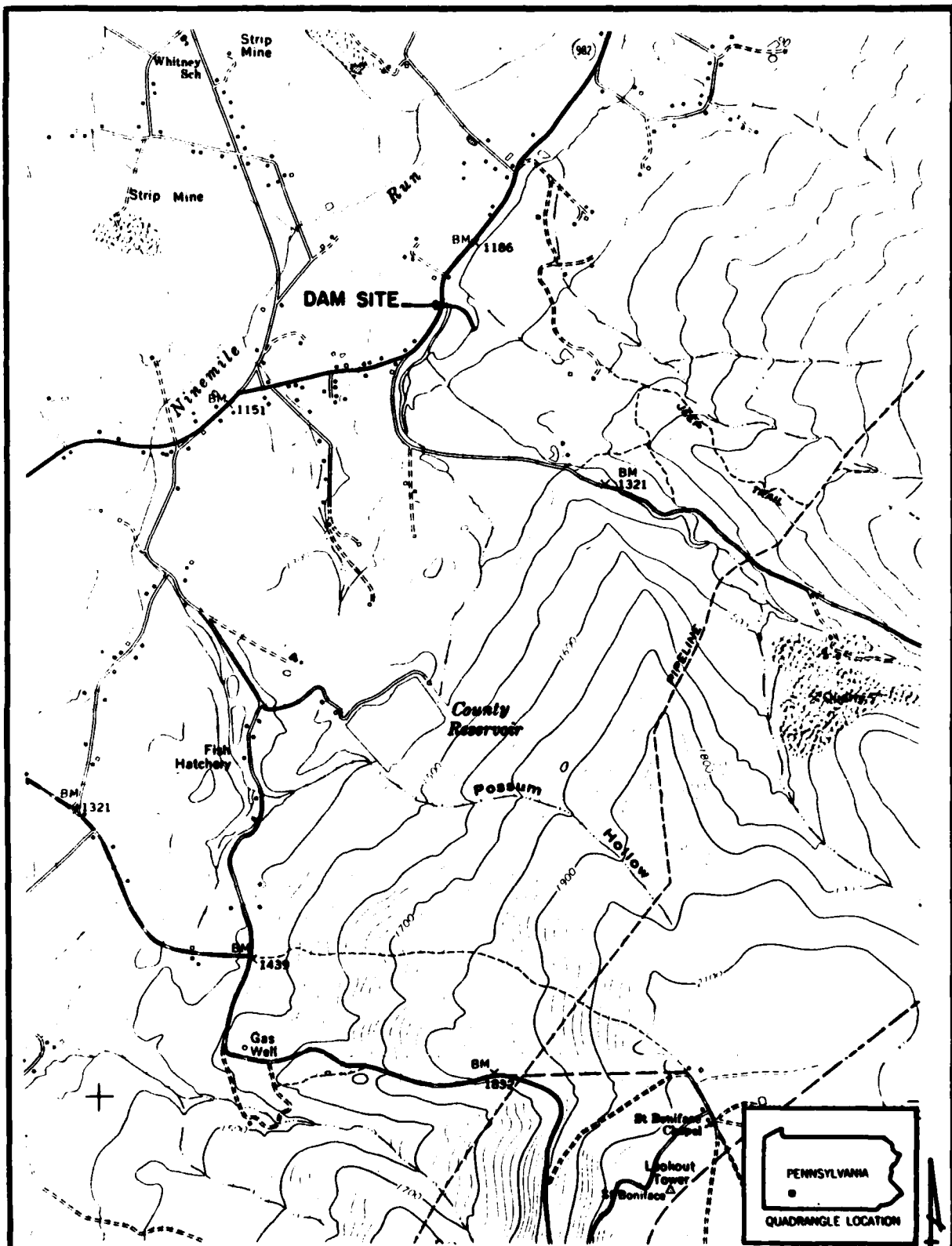


APPENDIX E

PLATES

LIST OF PLATES

- | | |
|-----------|--|
| Plate I | Regional Vicinity Map. |
| Plate II | "Proposed Extension of Spillway of Whitney Reservoir" H. C. Frick Coke Company, dated 26 March 1915. |
| Plate III | Survey plan, profile and sections. |



MAMMOTH U.S.G.S. 7 1/2 min. QUADRANGLE

DATE: JULY 1980

SCALE: 1" = 2000'

DR: JF

CK:

DWG. NO. PLATE I

WHITNEY RIDGE DAM
NATIONAL DAM INSPECTION PROGRAM

A. C. ACKENHEIL & ASSOCIATES, INC.
CONSULTING ENGINEERS
PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.

REGIONAL
VICINITY
MAP

Ditch

4-6

Elev. 1195

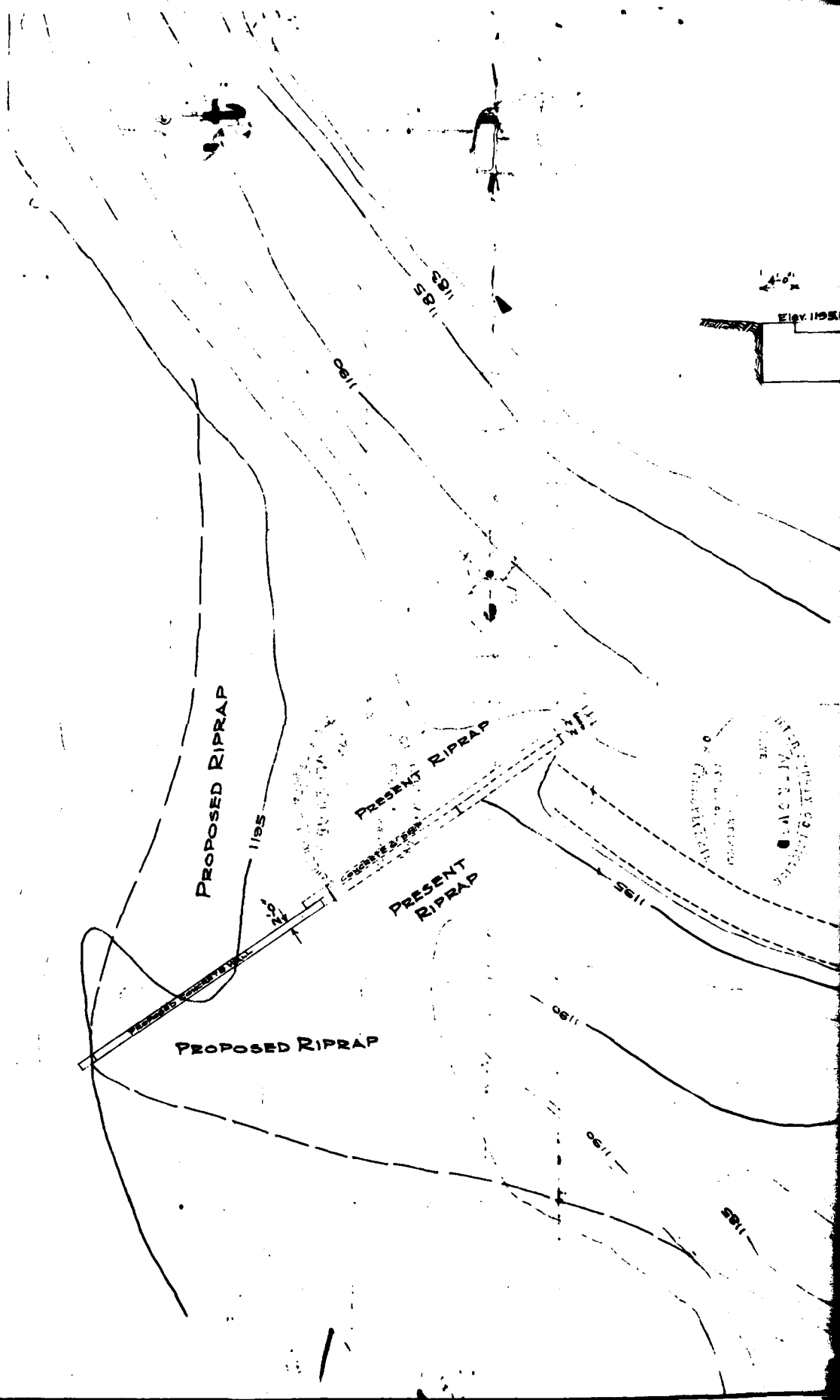
PROPOSED RIPRAP

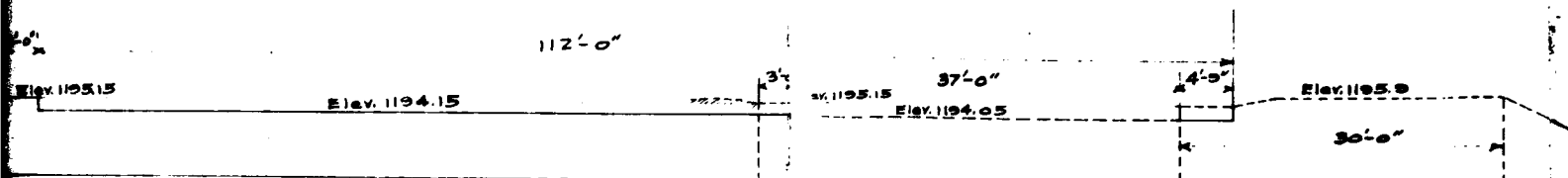
PRESENT RIPRAP

PRESENT RIPRAP

PROPOSED RIPRAP

UNITED STATES
NAVY
ENGINEERING
OFFICE
OF CHIEF OF ENGINEERS
WASHINGTON, D. C.





CROSS SECTION OF SPILLWAY.

Scale: - 1"=10'

Note: - Present spillway shown dotted.
Proposed extension shown full lines.

BREAST OF RESERVOIR

H.C. FRIC

SCOTT
PROPOSED
OF SPILLWAY
RESERVOIR

MADE BY *CAF*

CHECKED BY

CHECKED FOR SAFETY

APPROVED

SCALE: 1"=20'

DRAWING No.

No. OF SHEETS

NO

REVISION

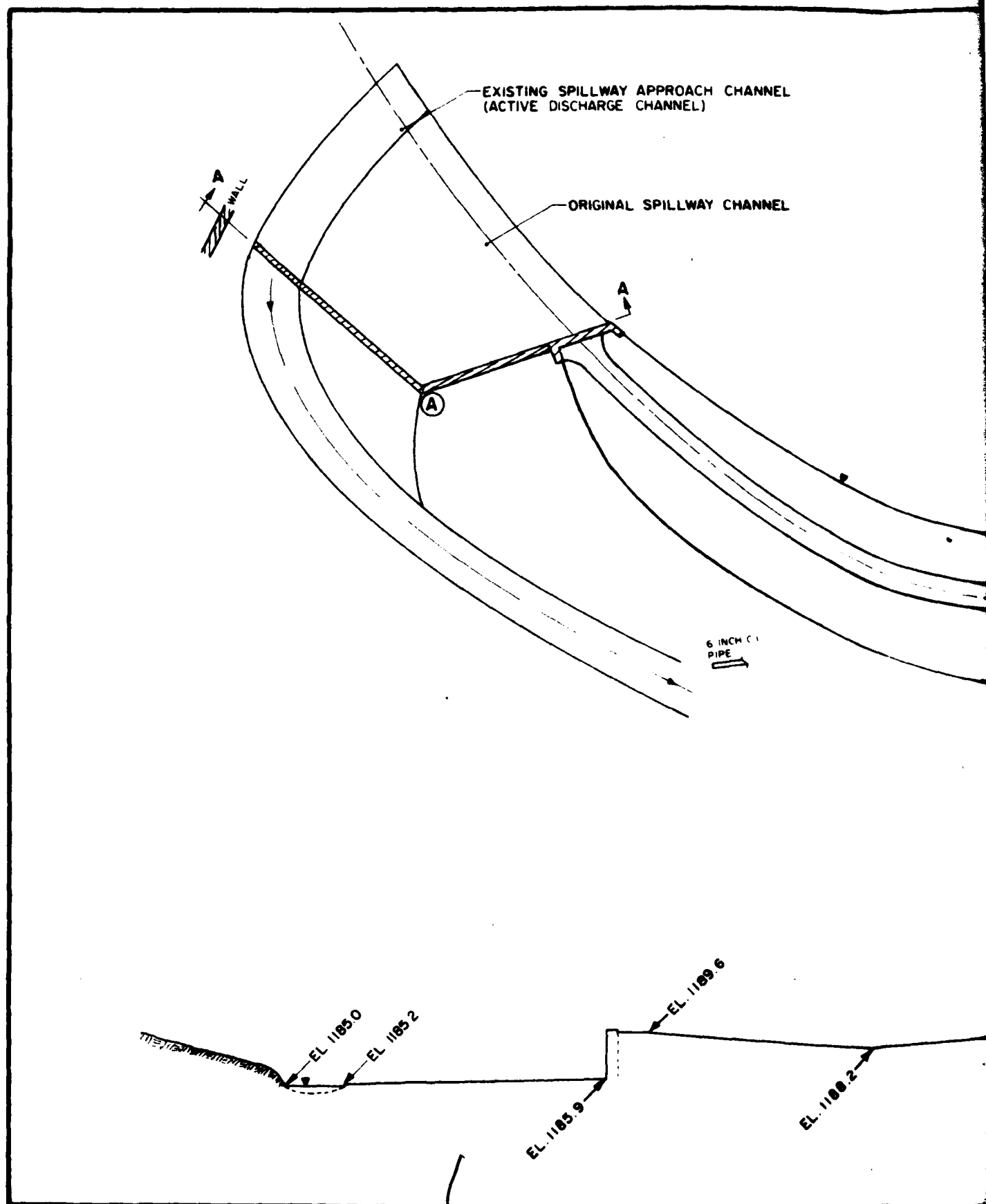
DATE

CHK'D BY

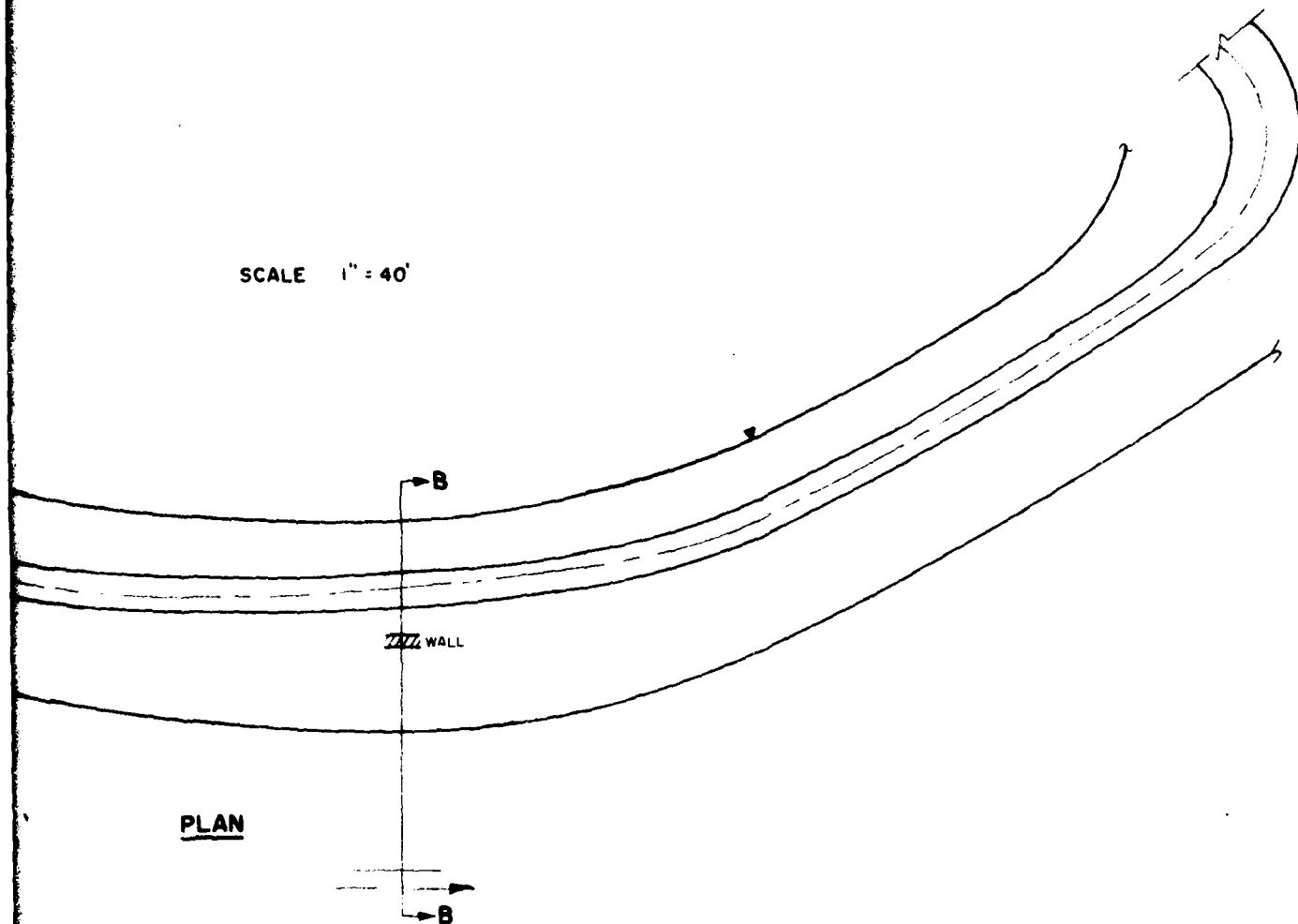
DESTROY ALL COPIES OF PREVIOUS DATE

CK COKE CO.
DALE PA
EXTENSION
AY OF WHITNEY
BYOIR.

10-Q-18
PLATE II

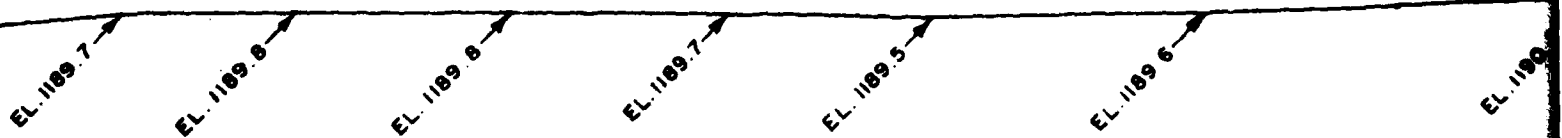


SCALE 1" = 40'

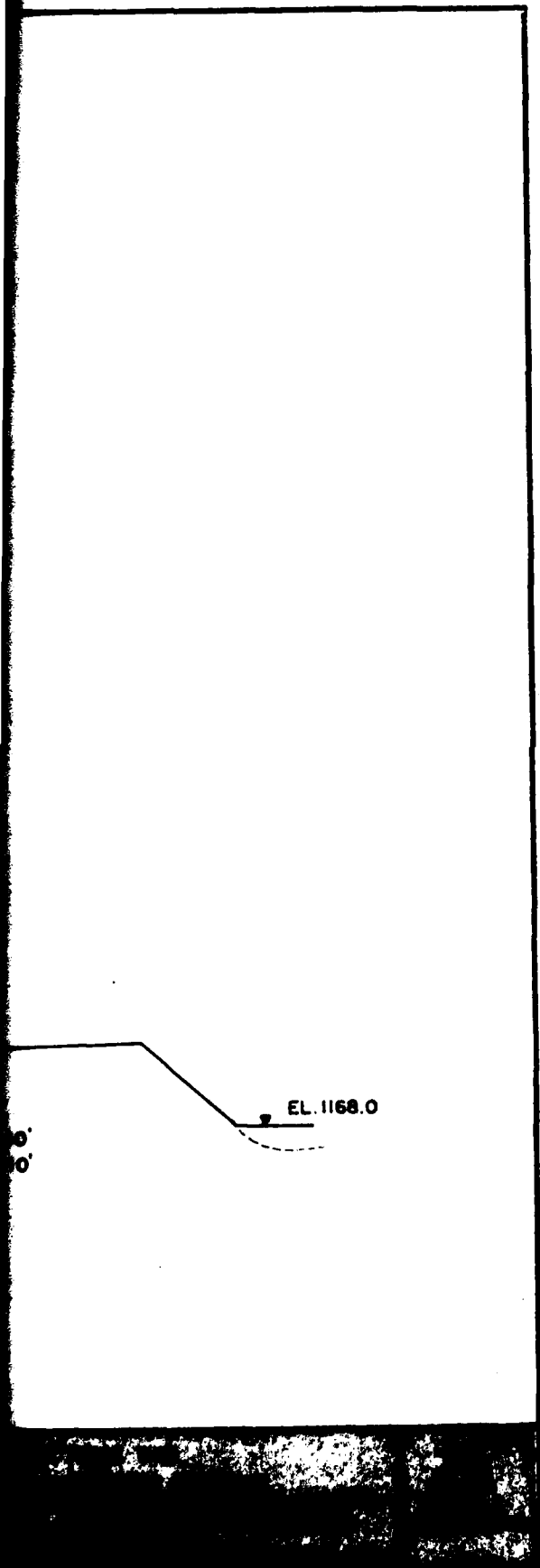


PLAN

SCALE: HORZ. 1" = 40'
VERT. 1" = 10'



DAM PROFILE
(LOOKING UPSTREAM)
(ALONG CENTERLINE)



EL. 1168.0

4

GEOLOGY

Geomorphology

Whitney Ridge Dam is located on the eastern edge of the Pittsburgh Plateau section of the Appalachian Plateau Physiographic Province. The rocks which underlie this area are in transition between the flat lying strata of the Pittsburgh Plateau and the alternating anticlines and synclines of the Allegheny Mountains. Whitney Ridge Dam is situated along an unnamed tributary of Ninemile Run. Both the unnamed tributary and Ninemile Run flow north along the toe of Chestnut Ridge. The streambed near the dam is at Elevation 1200 feet. The topography immediately west of the dam site ranges from Elevation 1200 to 1300 feet. Topography east of the site rises to the crest of Chestnut Ridge at Elevation 2100 feet.

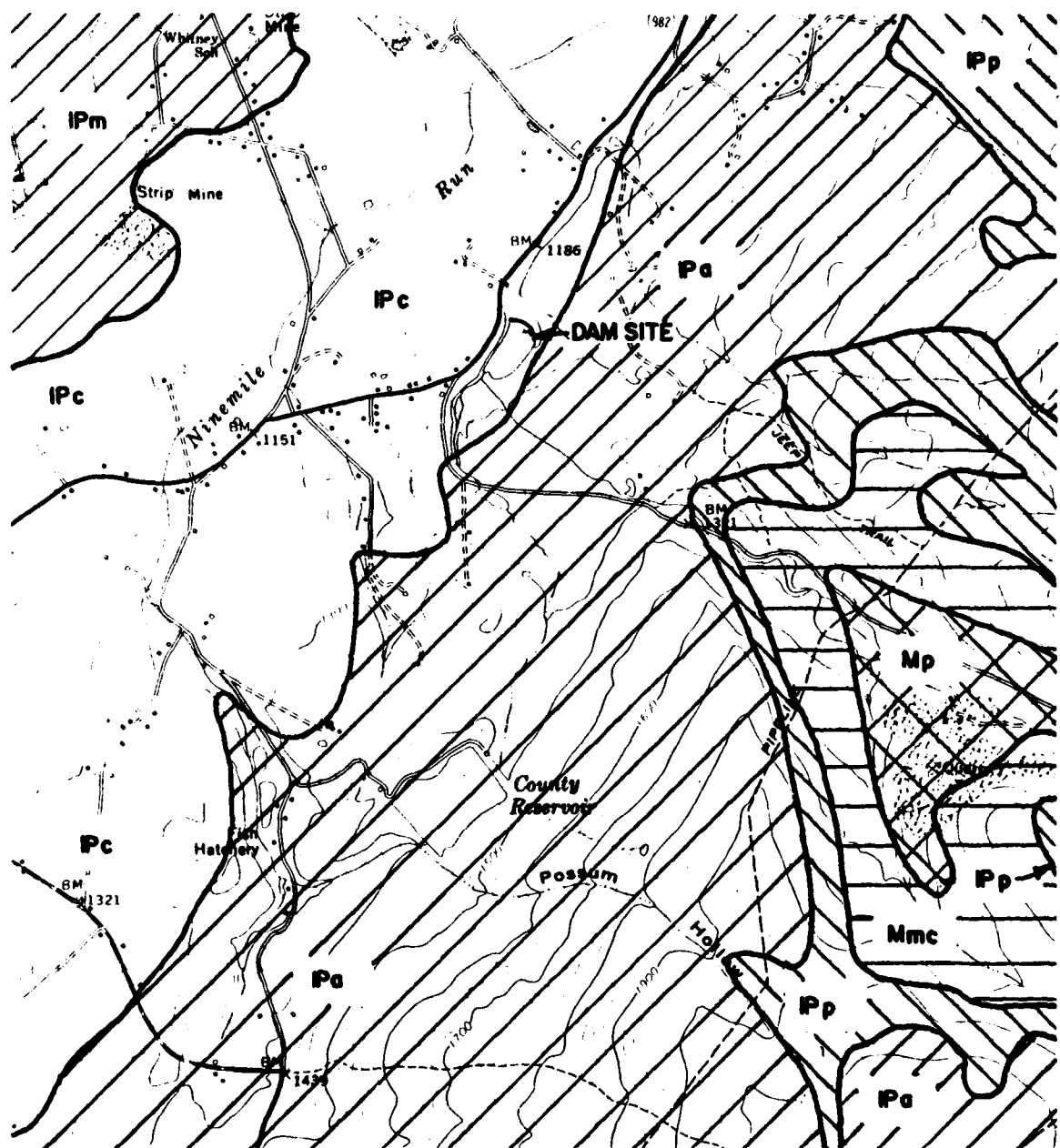
Structure

Regionally, the dam site lies midway between the axis of the Chestnut Ridge Anticline to the east and the Uniontown-Latrobe Syncline to the west. The bedrock strata near the dam site dip 900 feet/mile (9.8°) to the west.

Stratigraphy

General: The Whitney Ridge Dam is located along the stratigraphic boundry of the Allegheny Group and the Conemaugh Group, both of Pennsylvanian Age. The Upper Freeport Coal Seam, which marks the stratigraphic boundry between these two groups, outcrops along the east side of the dam site.

Rock Types: The dam is located in the shale and sandstone that immediately overlies the Upper Freeport Coal.



MAMMOTH QUADRANGLE, WESTMORELAND COUNTY, PENNSYLVANIA

SCALE:  1:24000

CONTOUR INTERVAL 20 FT. DATUM IS MEAN SEA LEVEL

—— FORMATION CONTACT



DATA OBTAINED FROM PENNSYLVANIA TOPOGRAPHIC AND GEOLOGIC SURVEY GREATER PITTSBURGH REGION GEOLOGIC MAP AND CROSS SECTIONS, 1975 and GREATER PITTSBURGH REGION STRUCTURE CONTOUR MAP, 1975

DATE: JULY 1980

SCALE: 1" = 2000'

BY:  CK:

WHITNEY RIDGE DAM
NATIONAL DAM INSPECTION PROGRAM

A. C. ACKENHEIL & ASSOCIATES, INC.
CONSULTING ENGINEERS
PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.

GEOLOGIC
MAP

AGE	VC 200 R Y E R	COLUMNAR SECTION	PROMINENT BEDS
QUATERNARY			PLEISTOCENE GLACIAL OUTWASH, RIVER TERRACE DEPOSITS AND ALLUVIUM
PERMIAN	DURAND (PP4)		UPPER WASHINGTON LIMESTONE
			WASHINGTON COAL
			WYTHESBURG SANDSTONE
			WYTHESBURG COAL
			LEWISTOWN SANDSTONE
			LEWISTOWN COAL
			BENWOOD LIMESTONE
			SEWICKLEY COAL
			PITTSBURGH SANDSTONE
			PITTSBURGH COAL
PENNSYLVANIAN	CONDONIA (P3)		CORNELLVILLE SANDSTONE
			MORGANTOWN SANDSTONE
			AMES LIMESTONE
			PITTSBURGH RED BEDS
			SALTSBURG SANDSTONE
			MAHONING SANDSTONE
			UPPER FREEPORT COAL
			UPPER KITTANNING COAL
			WORTHINGTON SANDSTONE
			LOWER KITTANNING COAL
MISSISSIPPIAN	POTTSVILLE (P2)		HOMEWOOD SANDSTONE
			MERCER SANDSTONE, SHALE & COAL
			CONNOQUENESSING SANDSTONE
			BURGESS SANDSTONE
			CUYAHOGA SHALE
			BEREA SANDSTONE

DATE: JULY 1980		WHITNEY RIDGE DAM NATIONAL DAM INSPECTION PROGRAM		GEOLOGIC COLUMN
SCALE: 1" = 360'				
DR: JF	CK:	A. C. ACKENHEIL & ASSOCIATES, INC. CONSULTING ENGINEERS PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.		

END

DATE
FILME

81

|

—

DTIC